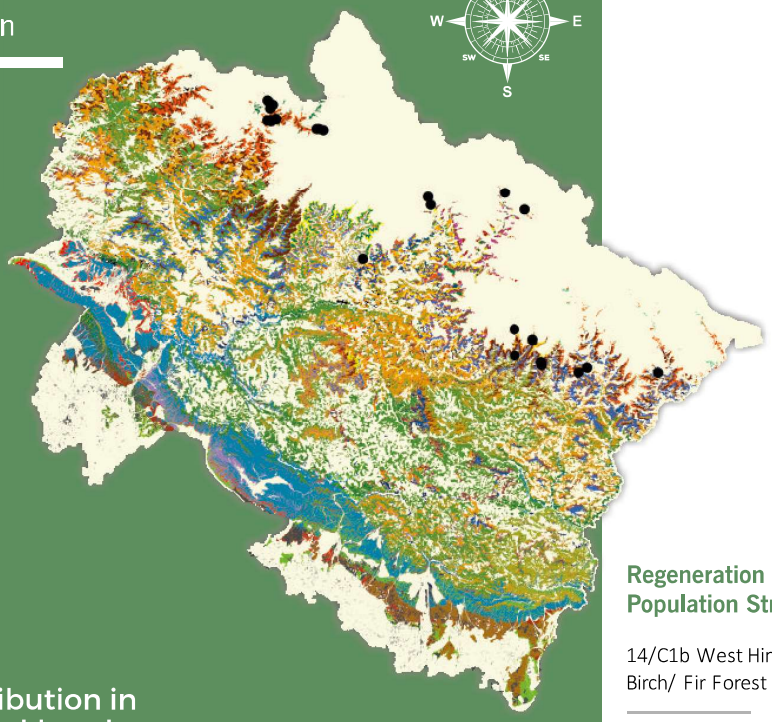
Betula utilis

D. Don



Distribution in Uttarakhand

Species is gregarious in higher elevations with *Rhododendron anthopogon* as an under shrub. Occurs along the great Himalayan Range between 2,800-4,000 m.

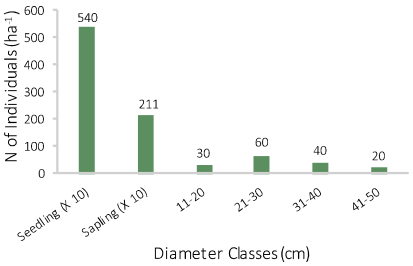
Occurrence in Forest Types
14/C1a, 14/C1b, 14/1S1, 14/1S2 and 15/C1.

Forest Divisions
Pithoragarh, Uttarkashi, Bageshwar and Valley of Flowers Notational Park, Tons and Rudraprayag.

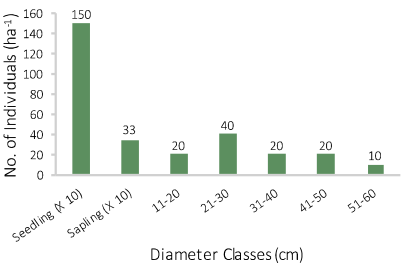
Overall regeneration status of the species was 'good'. The proportion of densities of all stages showed variations. In West Himalayan Sub-Alpine Birch Forest, densities of seedlings and saplings estimated were: 5,400 ha^{-1} and 2,110 ha^{-1}, respectively. However, in Deciduous Sub-Alpine Forest values were 1,500 ha^{-1} and 330 ha^{-1}, respectively. Adult tree density was also observed higher in West Himalayan Sub-alpine Birch Forest. It is a 'timber line species' which is used as an indicator species for climate change studies. Hence, suitable measures are to be adopted for its conservation.

Regeneration Status and Population Structure

14/C1b West Himalayan Sub-Alpine Birch/ Fir Forest (n=150)



14/1S2 Deciduous Sub-Alpine Forest (n=110)

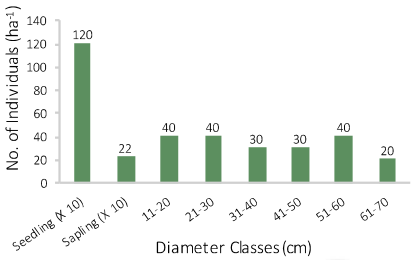


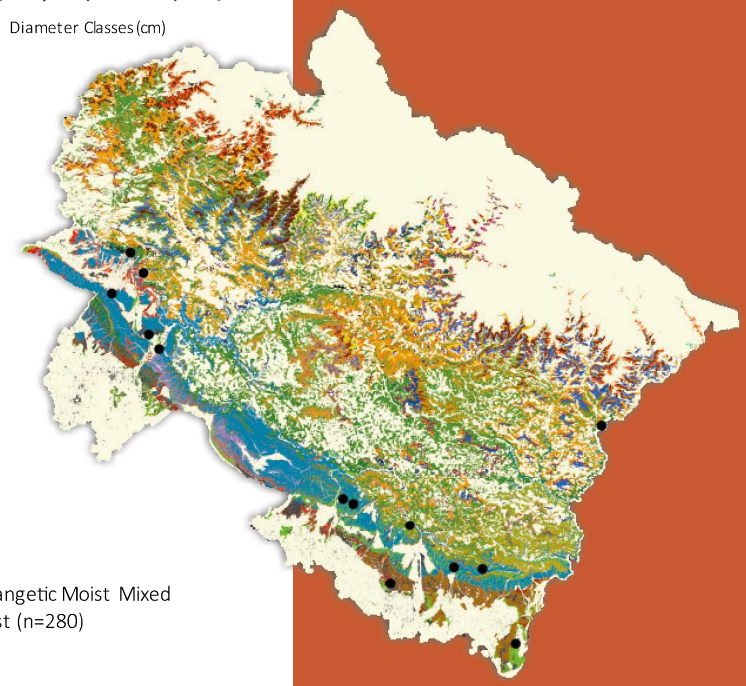
Bischofia javanica

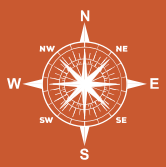
Blume

Regeneration Status and Population Structure

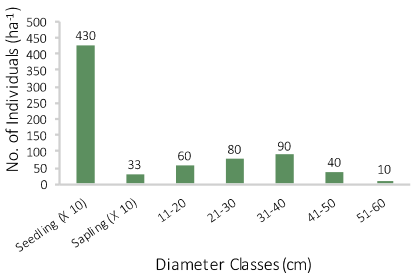
5B/C2 Northern Dry Mixed Deciduous Forest (n=200)



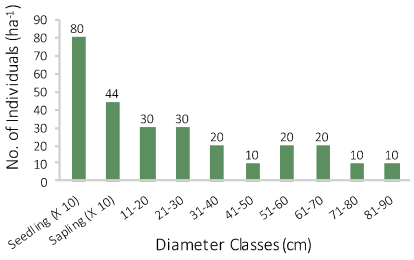




3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=280)



3C/C2a Moist Shiwalik Sal Forest (n=150)



Distribution in Uttarakhand

Species is found 200 to 1,300 m in the forests in Garhwal and Kumaon region.

Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a and 5B/C2.

Forest Divisions
Ramnagar, East Terai, Nainital, Dehra Dun, Mussoorie, Nandhaur Wildlife Sanctuary and Rajaji Tiger Reserve.

All assessed forest types exhibited 'good' regeneration. However, proportion of the seedlings, saplings and adult trees showed variations across forest types. Highest density (4,300 ha^{-1}) of seedlings was observed in West Gangetic Moist Mixed Deciduous Forest and it was lowest (800 ha^{-1}) in Moist Shiwalik Sal Forest. However, highest sapling density of 444 ha-1 was observed in Moist Shiwalik Sal Forest which indicated better conversion of seedlings to saplings. Higher adult tree densities of lower and medium diameter classes were observed in all sites. Highest adult tree density of 280 ha-1 was also observed in West Gangetic Moist Mixed Deciduous Forest. Suitable management strategies are required for its improvement and conservation.

Conservation of Forest Genetic Resources

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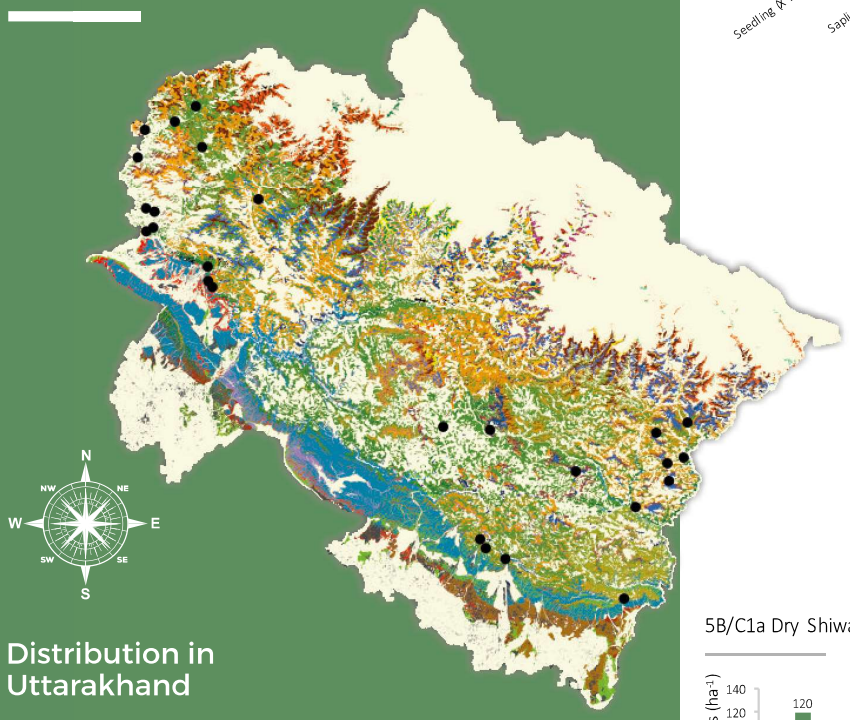
Uttarakhand State

Boehmeria rugulosa

Wedd.



Distribution in Uttarakhand

Species occurs in ravines up to 300-1500 m.

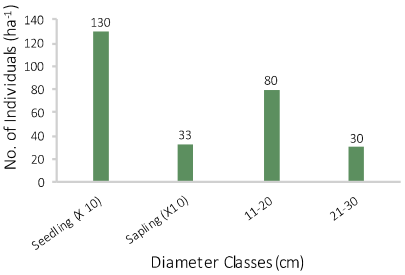
Occurrence in Forest Types
3C/C2a, 5B/C1a, 5B/C2, 9/C1a, 9/C1b, 12/C1a and 12/C1c.

Forest Divisions
Pithoragarh, Champawat, Uttarkashi, Nainital, Mussoorie and Tehri.

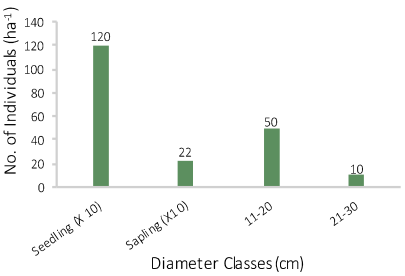
The species depicted 'good' regeneration in Dry Shiwalik Sal and Lower or Shiwalik Chir Pine Forest while it was observed 'fair' in Ban Oak Forest. Highest seedling density (1,300 ha^{-1}) was observed in Lower or Shiwalik Chir Pine Forest. Adult trees density was highest (120 ha^{-1}) in Ban Oak Forest and the lowest (60 ha^{-1}) in Dry Shiwalik Sal Forest. Higher density values of adult trees were observed in the lower diameter classes. Gene pool was low, hence, suitable, conservation strategies are to be adopted for its conservation.

Regeneration Status and Population Structure

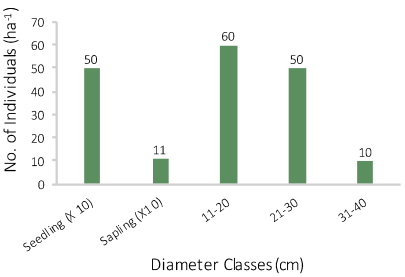
9/C1a Lower or Shiwalik Chir Pine Forest (n=110)



5B/C1a Dry Shiwalik Sal Forest (n=60)



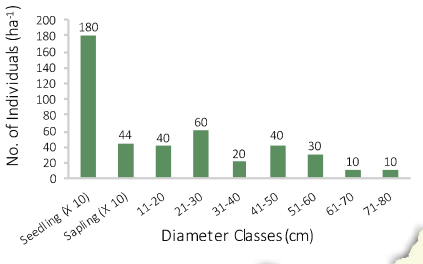
12/C1a Ban Oak Forest (n=120)

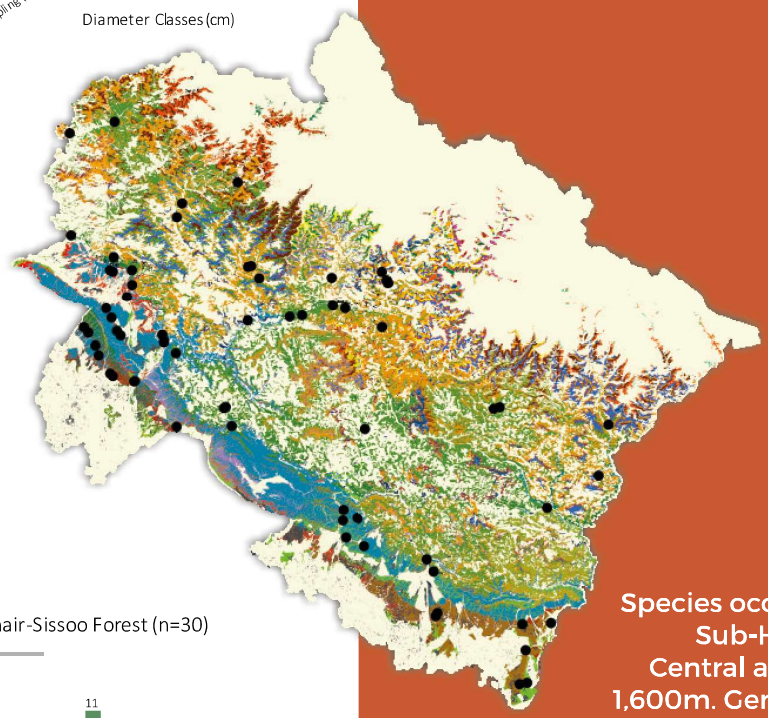


Bombax ceiba Linn.

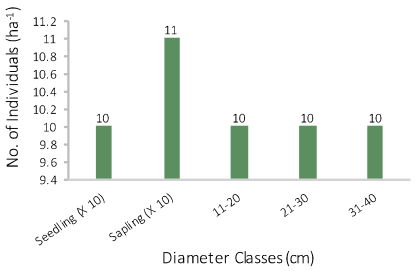
Regeneration Status and Population Structure

3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=210)

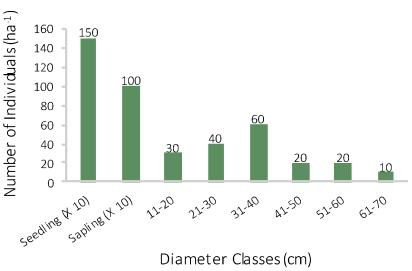


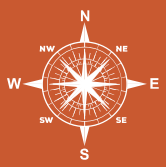


5/1S2 Khair-Sissoo Forest (n=30)



5B/C2 Northern Dry Mixed Deciduous Forest (n=180)





Distribution in Uttarakhand

Species occurs throughout the Sub-Himalayan tract and Central and Outer Hills up to 1,600m. Generally, scarce in the hills but very common in the Bhabar tract, especially on open grazing grounds and in miscellaneous forests.

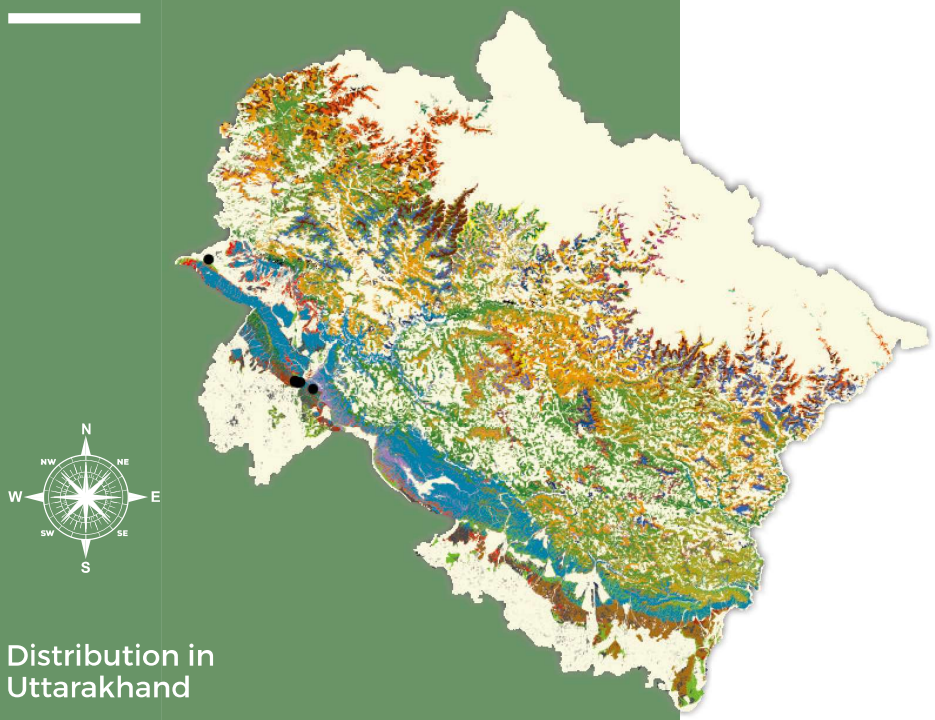
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/DS1, 5/1S2, 9/C1a, 9/C1b and 12/C1a.

Forest Divisions
Terai East, Ramnagar, Uttarkashi, Bageshwar, Mussoorie, Chakrata, Narendranagar, Rudraprayag, Tehri Dam –I, Badrinath, Tons, and Haldwani.

The species exhibited 'good' regeneration in West Gangetic Moist Mixed Deciduous Forest and Northern Dry Mixed Deciduous Forest while 'fair' regeneration in Khair-Sissoo Forest. However, densities in different density classes showed variations. Highest seedling density (1,800 ha^{-1}) was observed in West Gangetic Moist Mixed Deciduous Forest and the lowest value (100 ha^{-1}) in Khair-Sissoo Forest. Similar trend was observed in sapling and adult stages. Species is very important for its economic and aesthetic values, hence, suitable strategies are to be developed for its conservation and improvement.

Boswellia serrata

Roxb.



Distribution in Uttarakhand

Species occurs throughout the Sub-Himalayan tract and Central and Outer Shiwaliks hills up to 1,500 m. Generally, scarce in the hills but very common in the Bhabar especially on open grazing grounds and in miscellaneous forests.

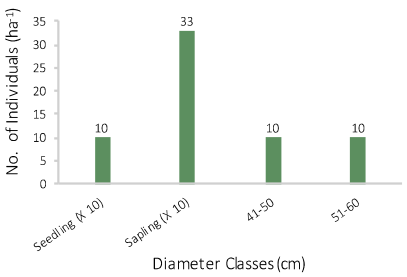
Occurrence in Forest Types
3C/C2a and 5B/C2.

Forest Divisions
Kalsi Soil Conservation.

The species was restricted to only Haridwar Forest Division 'fair' regeneration was depicted. Higher sapling density than seedlings indicated disturbance in the area resulting low establishment into saplings in recent time. Absence of lower and middle diameter classes in adult trees again indicated disturbance. Highly valued tree for gum, hence, suitable management practices should be adopted for its conservation and improvement.

Regeneration Status and Population Structure

5B/C2 Northern Dry Mixed Deciduous Forest (n=20)



Conservation of Forest Genetic Resources

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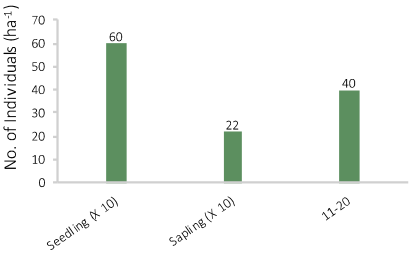
Pilot Project

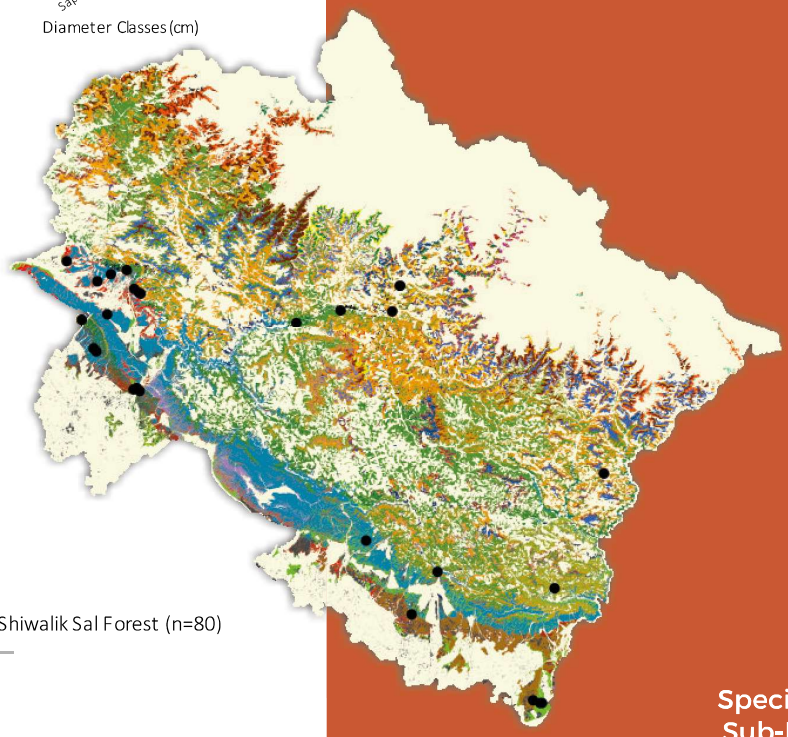
Bridelia retusa

Spreng.

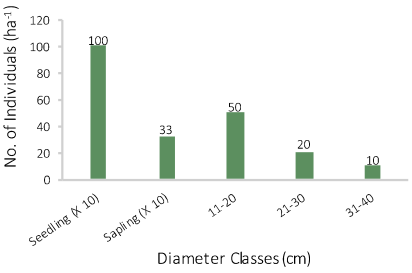
Regeneration Status and Population Structure

3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=40)

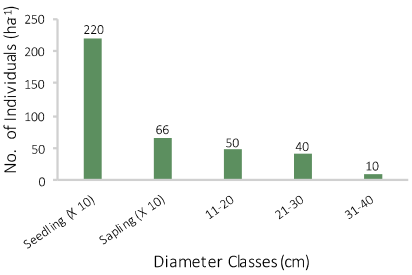




5B/C1a Dry Shiwalik Sal Forest (n=80)



3C/C2c Moist Terai Sal Forest (n=100)



Distribution in Uttarakhand

Species occurs in the Sub-Himalayan tract up to 900 m.

Occurrence in Forest Types

3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/1S2, 9/C1a, 9/C1b and 12/C1a.

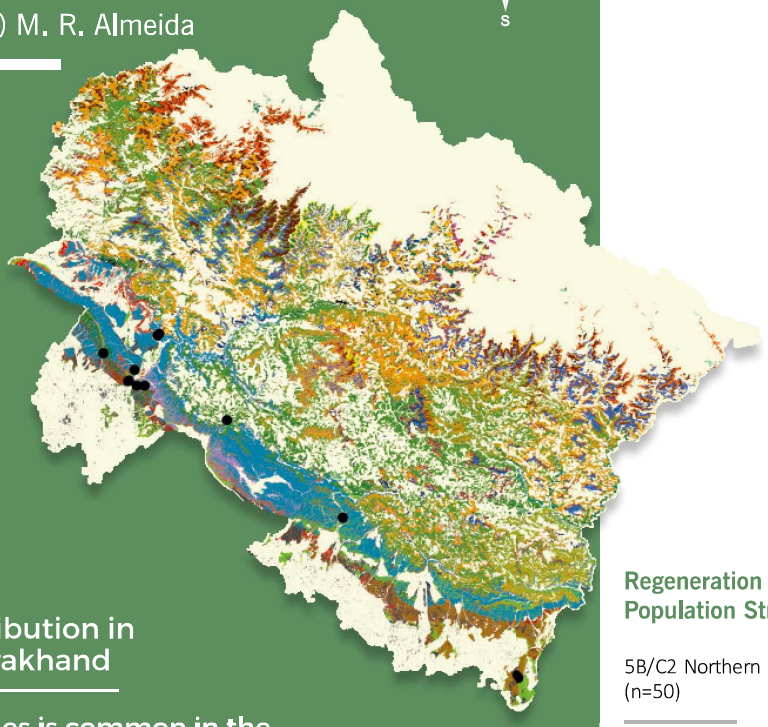
Forest Divisions

Terai East, Pithoragarh, Nainital, Ramnagar, Dehra Dun, Tons, Mussoorie, Rudraprayag, Badrinath, Champawat, Haldwani, Terai Central, Tehri and Corbett Tiger Reserve.

The species depicted overall 'good' regeneration in all forest types. However, proportion of densities of seedlings, saplings and adults showed variations. Highest seedling density (2,200 ha^{-1}) was observed in Moist Terai Sal Forest and lowest (600 ha^{-1}) in West Gangetic Moist Mixed Deciduous Forest. Similar trend was observed in case of saplings and adult trees stages. Highest adult tree density (100 ha^{-1}) was also recorded in Moist Terai Sal Forest. Adult tree density was less indicating low gene pool. Hence, suitable management strategies are to be developed for its conservation and improvement.

Buchanania cochinchinensis

(Lour.) M. R. Almeida



Distribution in Uttarakhand

Species is common in the Sal forests of the Garhwal and Kumaun region.

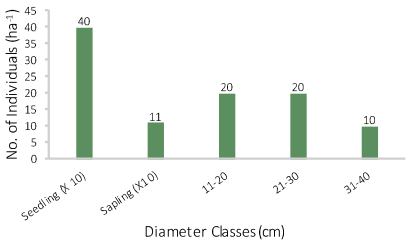
Occurrence in Forest Types
3C/C2a, 3C/C2c, 5B/C2 and 5/1S2

Forest Divisions
Ramnagar, Lansdowne, Terai East, Haldwani, Kalsi Soil Conservation and Rajaji Tiger Reserve.

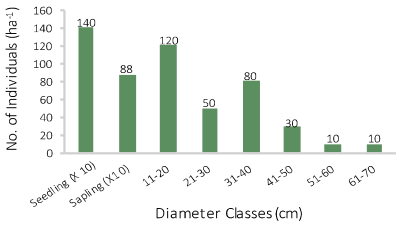
'Good' regeneration of the species was observed as densities values were in order of: seedlings>saplings>adults. Seedling density values of 1,400 ha^{-1} and 880 ha^{-1} were recorded in Moist Terai Sal and Northern Dry Mixed Deciduous Forest, respectively. Saplings and adult tree stages also showed similar trend. Adult tree density of 300 ha^{-1} and 50 ha^{-1} were observed in Moist Terai Sal and Northern Dry Mixed Deciduous Forest, respectively. Maximum number of individuals were in the lower and middle diameter classes. Highly valued tree species for its seed, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

5B/C2 Northern Dry Mixed Deciduous Forest (n=50)



3C/C2c Moist Terai Sal Forest (n=300)



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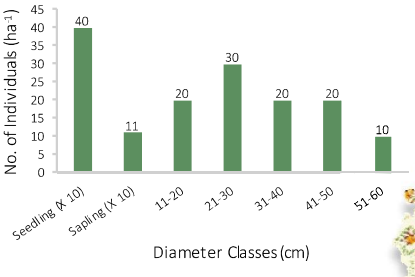
Butea monosperma

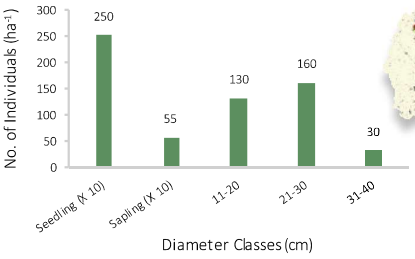
(Lam.) Kuntze

Regeneration Status and Population Structure

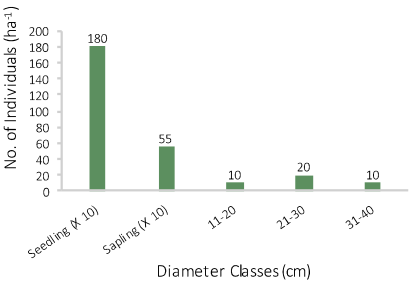
5/DS1 Dry Deciduous Scrub (n=100)



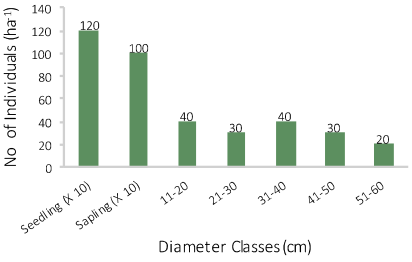
5/1S2 Khair- Sissoo Forest (n=320)

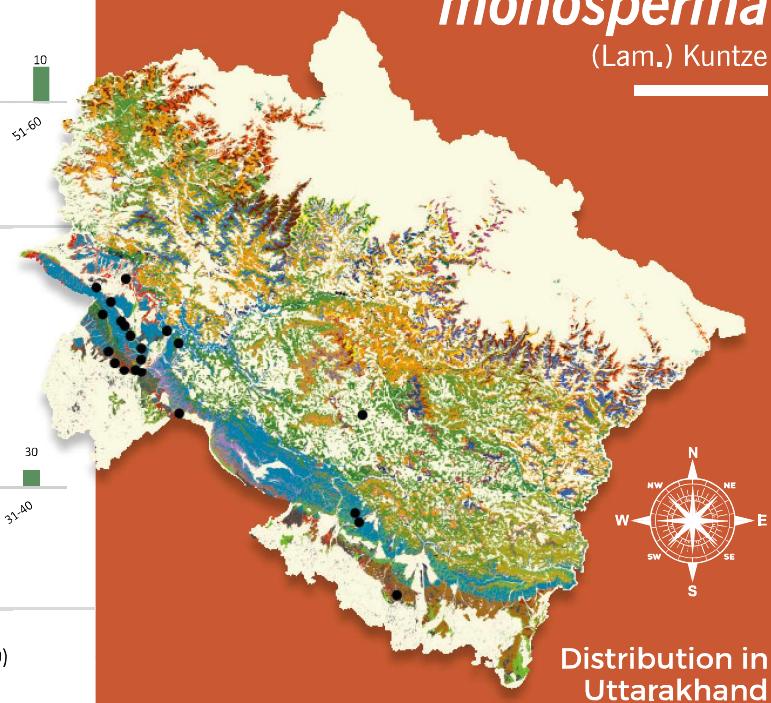


3C/C2a Moist Shiwalik Sal Forest (n=40)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=150)





Distribution in Uttarakhand

Species is commonly found in the lower Shiwaliks and Bhabhar region and most indigenous tree of Upper Gangetic Plain up to 1000 m.

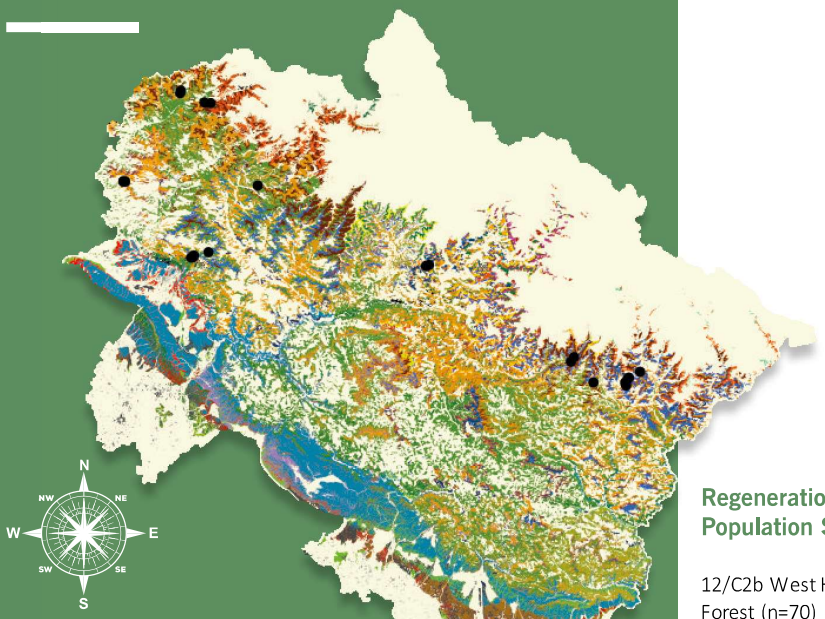
Occurrence in Forest Types
3C/C2a, 3C/C3a, 5B/C1a, 5B/C2, 5/DS1 and 5/1S2.

Forest Divisions
Ramnagar, Kalsi Soil Conservation, Haridwar, Narendranagar, Lansdowne, Terai Central, Terai East, Mussoorie, Dehra Dun, Rajaji Tiger Reserve.

The species an overall exhibited 'good' regeneration. However, proportion of seedlings, saplings and adults showed variations. Highest seedlings density 2,500 ha^{-1} was observed in Khair-Sissoo Forest While the lowest 400 ha^{-1} in Dry Deciduous Scrub Forest. Higher density values of Saplings and Adult tree population with more diameter classes were observed in West Gangetic Moist Mixed Deciduous Forest. Important tree species of subtropical region, hence, suitable strategies are to be developed for its conservation and improvement.

Buxus wallichiana

Baill.



Distribution in Uttarakhand

Species occurs on the Middle Himalayas between 1,800-2,800 m.

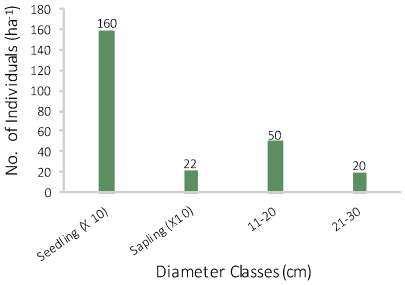
Occurrence in Forest Types
9/C1a, 9/C1b, 9/DS1, 12/C1a, 12/C1b, 12/C1c, 12/C2b, 12/C2d, 12/C1/DS1 and 14/1S2.

Forest Divisions
Bageshwar, Mussoorie, Chakrata, Nainital, Uttarkashi, Pithoragarh and Govind Pashu Vihar.

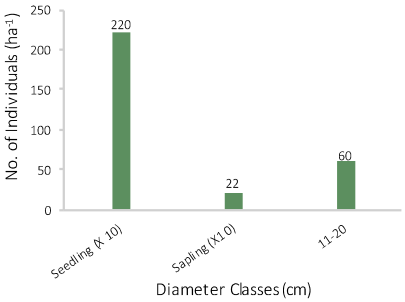
The species depicted 'good' regeneration. Seedling density values of observed 2,200 ha^{-1} and 1,600 ha^{-1} in Ban Oak and West Himalayan Upper Oak /Fir Forest, respectively. Sapling density of 220 ha^{-1} in both forest types was recorded. In Ban Oak Forest, adult density 60 ha^{-1} in 11-20 cm diameter class was observed while in Himalayan Upper Oak /Fir Forest, 50 tree ha^{-1} and 20 ha^{-1} of 11-20 cm and 21-30 cm diameter classes, respectively were observed. Beautiful small tree which may be considered for ornamental purpose. Scatteredly found in its natural range. Gene pool was narrow, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

12/C2b West Himalayan Upper Oak/Fir Forest (n=70)



12/C1a Ban Oak Forest (n=60)



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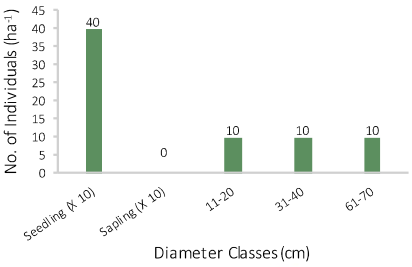
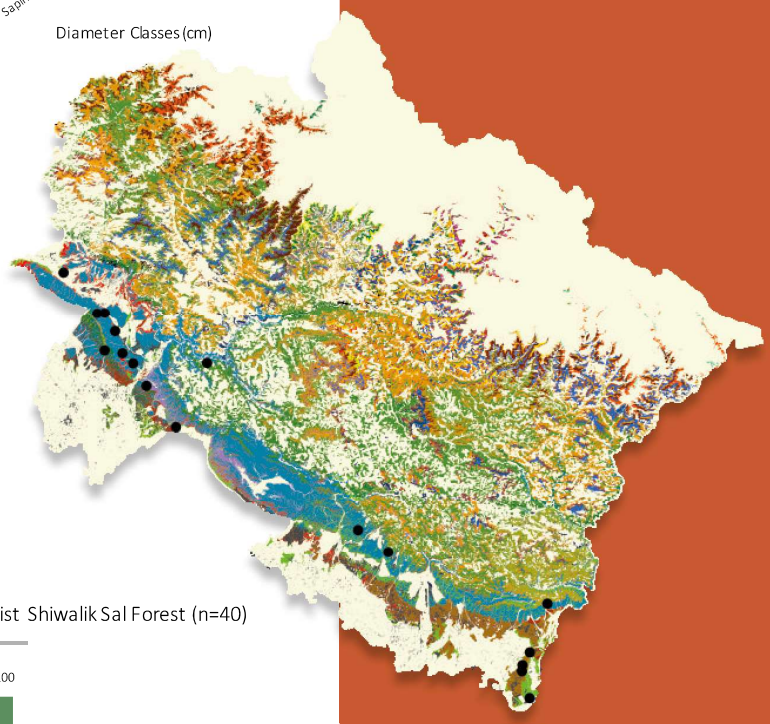
Careya arborea

Roxb.

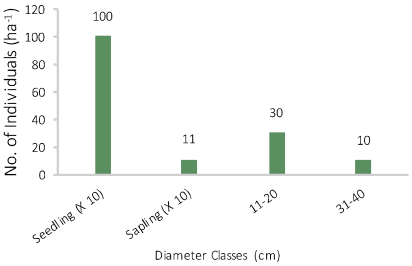
Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=30)

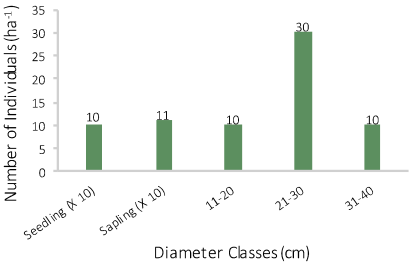




3C/C2a Moist Shiwalik Sal Forest (n=40)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=50)



Distribution in Uttarakhand

Species occurs in the Sub-Himalayan tract and Shiwalik hill ranges up to 700 m.

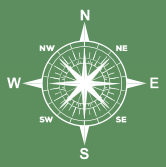
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2 and 9/C1b.

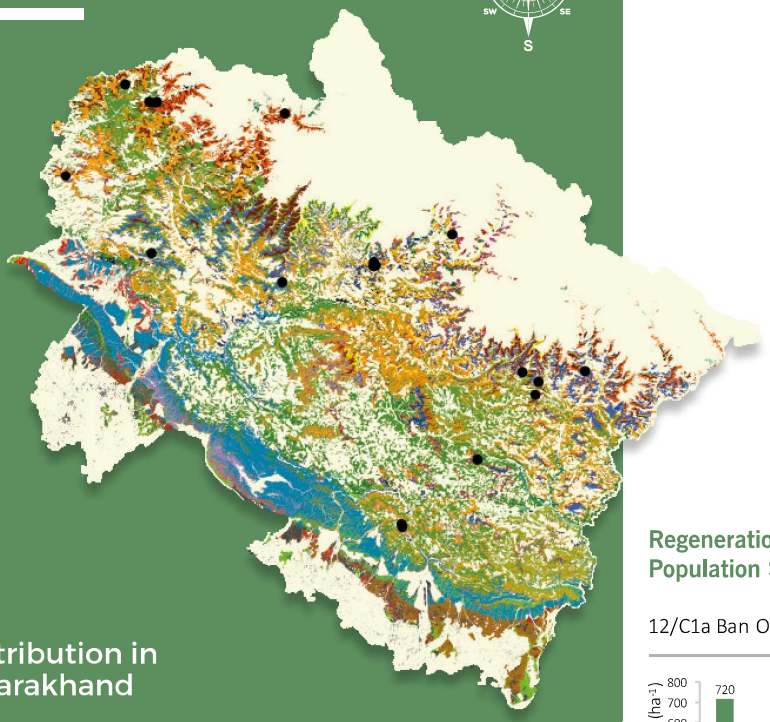
Forest Divisions
Chakrata, Terai East, Ramnagar, Champawat, Lansdowne, and Rajaji National Park.

The species depicted 'good' regeneration in Moist Shiwalik Sal Forest and West Gangetic Moist Mixed Deciduous Forest while 'fair' regeneration in Moist Terai Sal Forest. Highest seedling density 1000 ha^{-1} was recorded in Moist Shiwalik Sal Forest and the lowest 100 ha^{-1} was in West Gangetic Moist Mixed Deciduous Forest. Sapling density of 110 ha^{-1} was estimated for both West Gangetic Moist Mixed Deciduous and Moist Shiwalik Sal Forest. Adult tree population was mainly observed in lower diameter classes across forest types. Gene pool was very low, hence, adequate strategies are required for its conservation and improvement.

Carpinus viminea

Wall. ex Lindl.





Distribution in Uttarakhand

Species occurs throughout the hills in 2,100-2,500 m.

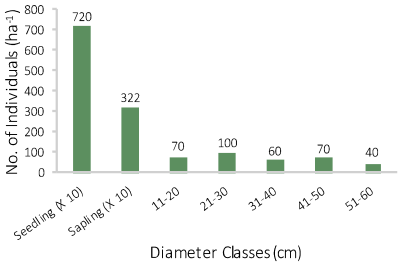
Occurrence in Forest Types
9/C1b, 12/C1a, 12/C1b,12/C1c, 12/C1d, 12/C2b and 14/1S2.

Forest Divisions
Tons, Uttarkashi, Bageshwar, Nainital, Rudraprayag, Kedarnath, Pithoragarh and Mussoorie.

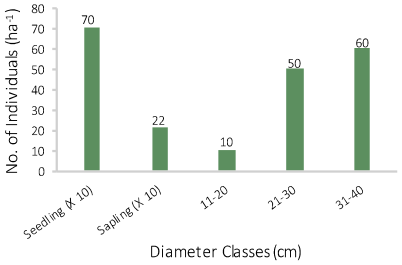
Overall 'good' regeneration of the species was observed. Seedling densities of 7,200 ha^{-1} and 700 ha^{-1} were observed in Ban Oak and West Himalayan Upper Oak/ Fir Forest, respectively. Sapling density 3,220 ha^{-1} was also high in Ban Oak Forest. Higher density values of adult trees were observed in the lower diameter classes. Gene pool was less, hence, suitable management strategies are required for its conservation.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=340)



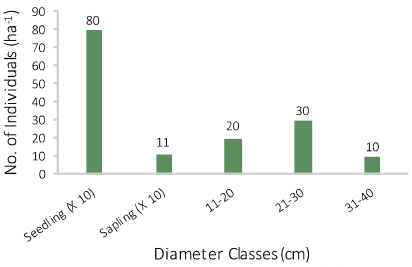
12/C2b West Himalayan Upper Oak Fir Forest (n=120)

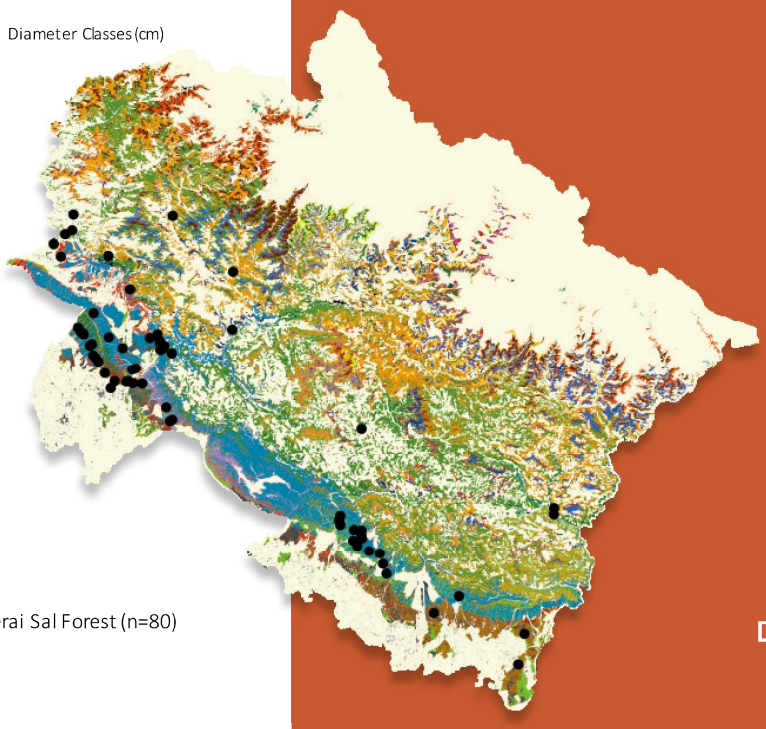


Cassia fistula Linn.

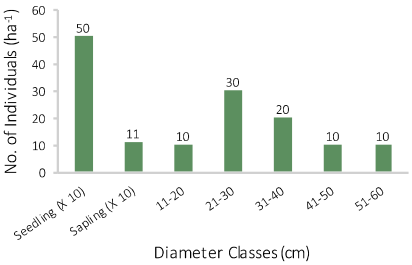
Regeneration Status and Population Structure

5B/C2 Northern Dry Mixed Deciduous Forest (n=60)

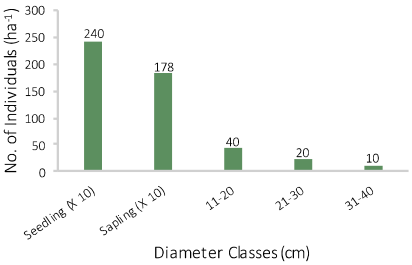




3C/C2c Moist Terai Sal Forest (n=80)



3C/C2a Moist Shiwalik Sal Forest (n=70)



Distribution in Uttarakhand

Species occurs throughout the area up to 1,200 m.

Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2 and 9/C1b.

Forest Divisions
Chakrata, Dehra Dun, Lansdowne, Mussoorie, Ramnagar, Pithoragarh, and Ramnagar.

The species depicted 'good' regeneration. Proportion of different diameter classes showed variations. Highest seedling, and sapling densities of 2,400 ha^{-1} and 1,780 ha^{-1}, respectively were registered in Moist Shiwalik Sal Forest while adult tree density of 80 ha^{-1} was obtained in Moist Terai Sal Forest under different diameter classes. Gene pool was low, hence, suitable, conservation strategies are to be adopted for its conservation.

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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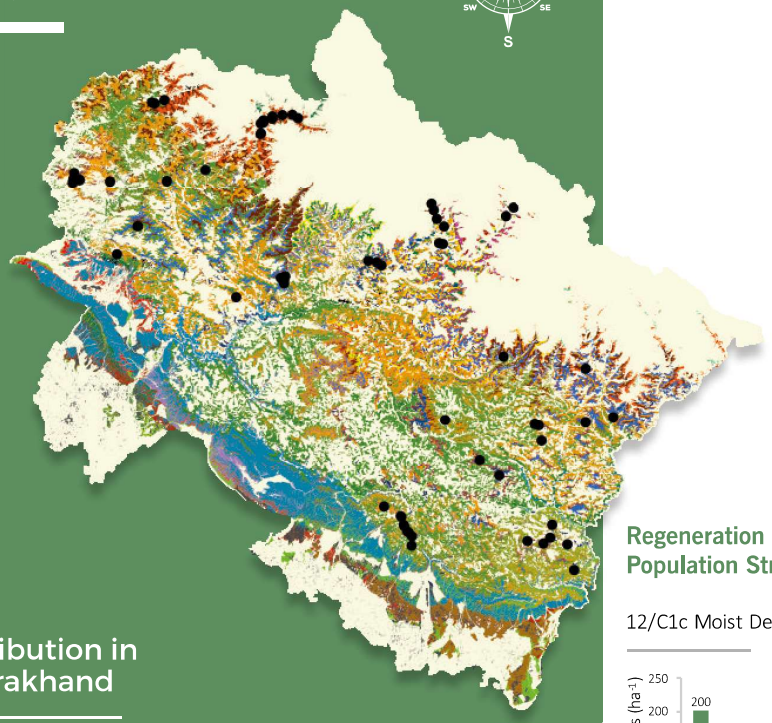
Uttarakhand State

Cedrus deodara

(Roxb.) Loud.



Distribution in Uttarakhand

Species occurs in 2,400-3,300 m.

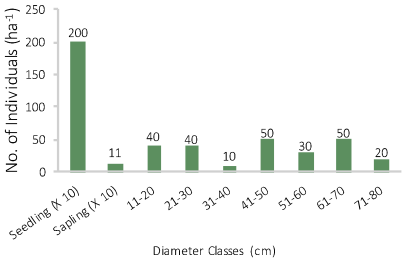
Occurrence in Forest Types
9/C1b, 9/DS1, 12/C1a, 12/C1b, 12/C1c, 12/C1d, 12/C2b, 13/C2b and 14/C1b.

Forest Divisions
Champawat, Uttarkashi, Pithoragarh, Nainital, Chakrata, Rudraprayag, Tehri Dam-I, Bageshwar, Mussoorie, Badrinath, Almora and Valley of Flowers National Park.

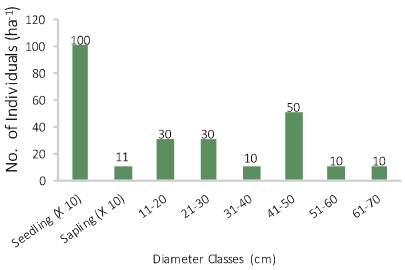
The species exhibited overall 'good' regeneration. Seedlings densities of 2,000 ha^{-1} and 1,000 ha^{-1} were observed in Moist Deodar and West Mixed Coniferous Forest, respectively. Sapling density values of 110 ha^{-1} were recorded in both forest types. Contribution of upper diameter classes in adult tree population was observed high in Moist Deodar Forest. Very important timber species, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

12/C1c Moist Deodar Forest (n=240)



12/C1d Western Mixed Coniferous Forest (n=140)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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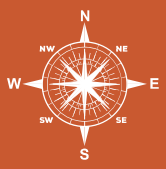
Pilot Project

Celtis australis

Linn.



Distribution in Uttarakhand

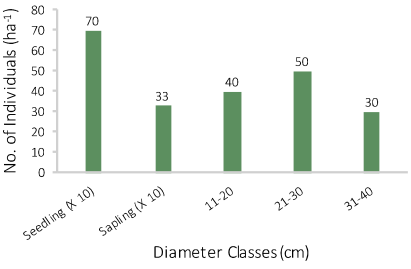
Species occurs along the main Himalayan Range between 1,600 m -2,800 m.

Occurrence in Forest Types
9/C1a, 9/C1b, 9/DS1, 12/C1a, 12/C2b and 12/C1/DS2.

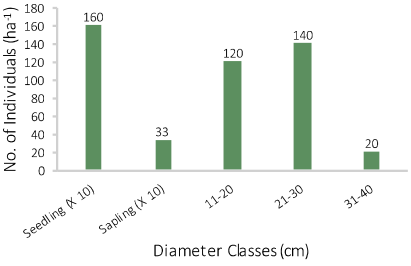
Forest Divisions
Uttarkashi, Rudraprayag, Tehri Dam-I, Chakrata, Kedarnath Wildlife, Pithoragarh, Lansdowne and Pauri.

Regeneration Status and Population Structure

12/C2b West Himalayan Upper Oak Fir Forest (n=120)



12/C1a Ban Oak Forest (n=280)



Regeneration of the species in two assessed forest types was 'good'. However, proportion of the seedlings, saplings and adult trees showed variations in both types. Density values of seedlings were estimated as 1,600 ha^{-1} and 700 ha^{-1} Ban Oak and West Himalayan Upper Oak Fir Forest, respectively. Higher adult tree densities of lower and medium diameter classes were observed in both forest types. Adult tree density of 280 ha^{-1} was also observed in Ban Oak forest and 120 ha^{-1} in West Himalayan Upper Oak Fir Forest. Important fodder species in the temperate regions, hence, suitable management strategies are required for its improvement and conservation.

Conservation of Forest Genetic Resources

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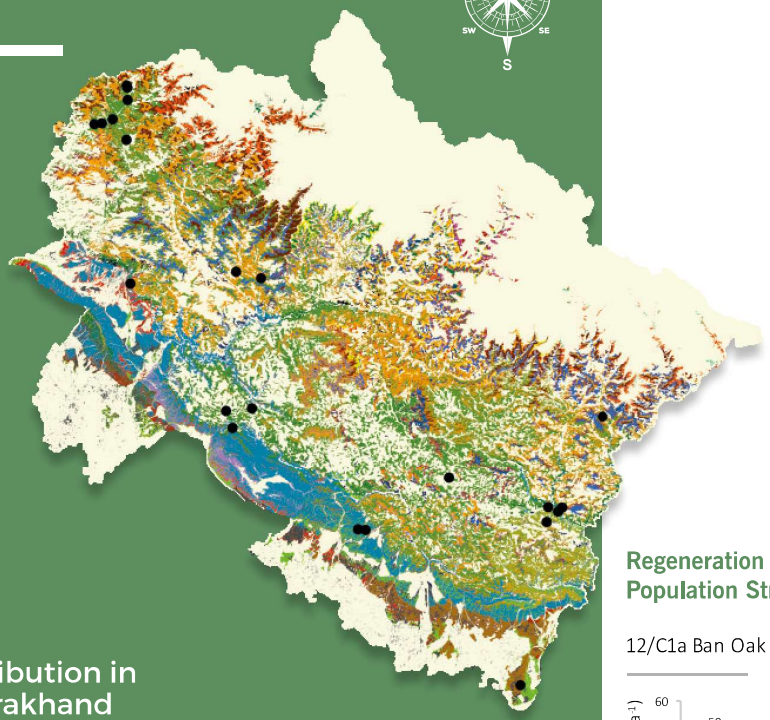
Uttarakhand State

Celtis tetrandra

Roxb.



Distribution in Uttarakhand

Species occurs in the Sub-Himalayan tract and in the Lesser and Outer Himalayan Ranges between 300 m and 1,800 m.

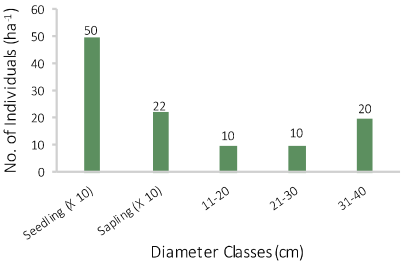
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 9/C1a, 9/C1b, 12/C1a, 12/C1b, 12/C1c and 12/ C1e.

Forest Divisions
Champawat, Dehra Dun, Mussoorie, Terai East, Pithoragarh, Ramnagar, Upper Yamuna, Tons, Tehri Dam –I, Almora and Kedarnath Wildlife Sanctuary.

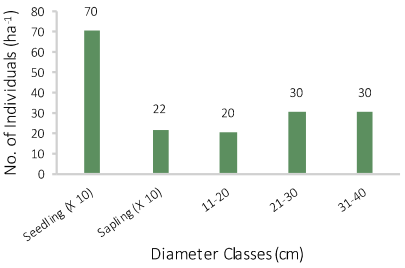
'Good' regeneration of the species was observed in both forest types assessed in their natural ranges. Density values of seedlings and saplings were estimated 1,600 ha^{-1} and 700 ha^{-1} in Ban Oak and West Gangetic Moist Mixed Deciduous Forest, respectively. Sapling density of 220 ha^{-1} was estimated in both forest types. Adult tree densities of lower and medium diameter classes were observed in both types. Important fodder species in sub-tropical region, hence, suitable management strategies are required for its improvement and conservation.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=40)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=80)



Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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Uttarakhand State

Cinnamomum tamala

Nees & Eberm.

Distribution in Uttarakhand

Species occurs throughout the hills up to 600-2,100 m.

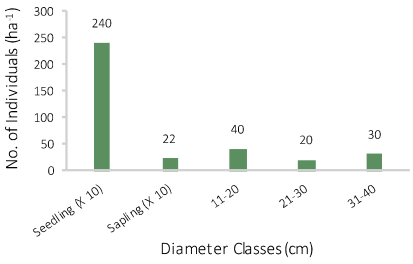
Occurrence in Forest Types
9/C1a, 9/C1b, 12/C1a, 12/C1b, 12/C1c, 12/C1d and 12/C2c.

Forest Divisions
Uttarkashi, Bageshwar, Nainital, Rudraprayag, Kedarnath Wildlife, Pithoragarh, Mussoorie, Tons, and Ranikhet.

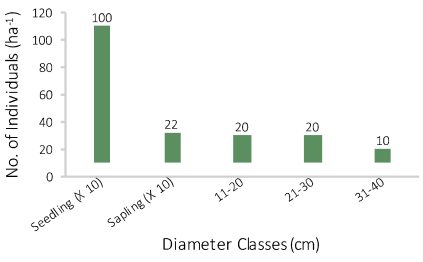
'Good' regeneration was observed in both assessed forest types. Seedling density of 2,400 ha^{-1} and 1,000 ha^{-1} were estimated in Ban Oak Forest and Upper or Himalayan Chir Pine Forest, respectively. Values of adult tree density were obtained low in both forest types. Highly valued species of temperate region, however, its gene pool was low, hence, suitable measures are required for its conservation.

Regeneration Status and Population Structure

9/C1b Upper or Himalayan Chir Pine Forest (n=90)

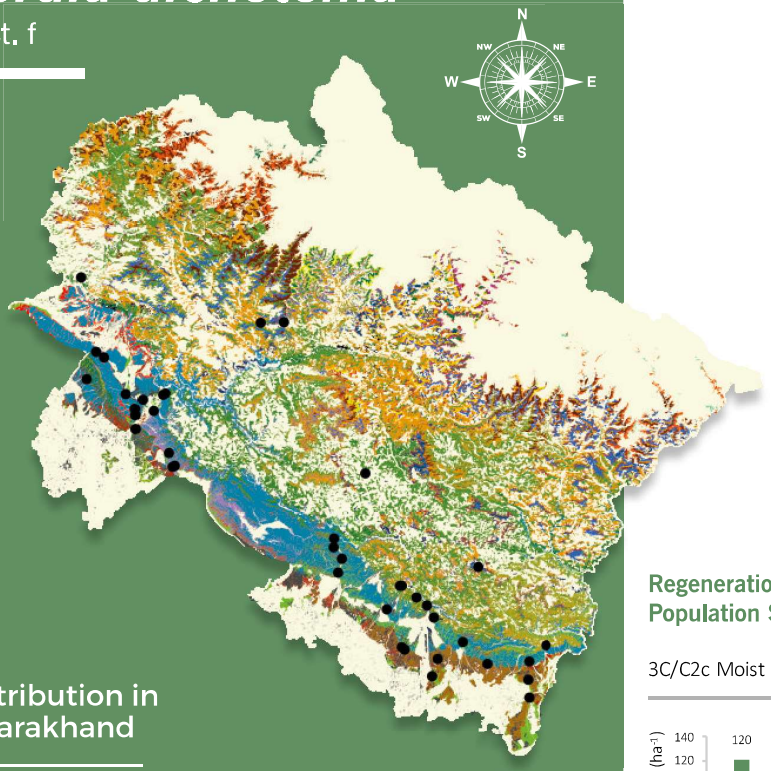


12/C1a Ban Oak Forest (n=50)



Cordia dichotoma

Forst. f



Distribution in Uttarakhand

Species occurs throughout the area up to 1,500 m.

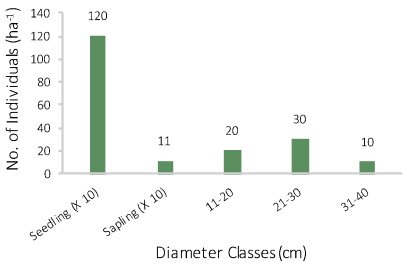
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/DS1, 9/C1a and 9/C1b.

Forest Divisions
Terai East, Ramnagar, Champawat, Nainital, Rudraprayag, Tehri Dam-I, Dehra Dun, Lansdowne, Kalsi, Haldwani and Terai Central.

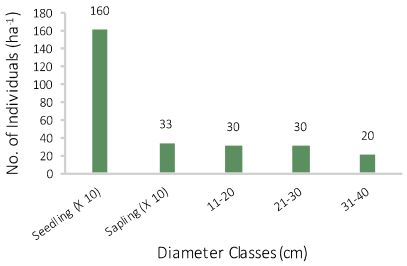
The species depicted 'good' regeneration in both forest types assessed in their distribution range. Seedling densities were estimated as 1,600 ha^{-1} and 1,200 ha^{-1} in Moist Shiwalik Sal Forest and Moist Terai Sal Forest, respectively. Saplings and adult trees of different diameter classes were observed in higher densities in Moist Shiwalik Forest. Species was scatterally distributed in the subtropical region. Gene pool was low, hence, suitable strategies are to be developed for its conservation.

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=60)



3C/C2a Moist Shiwalik Sal Forest (n=80)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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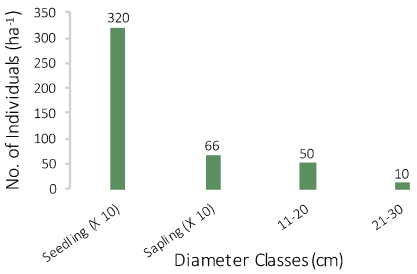
Pilot Project

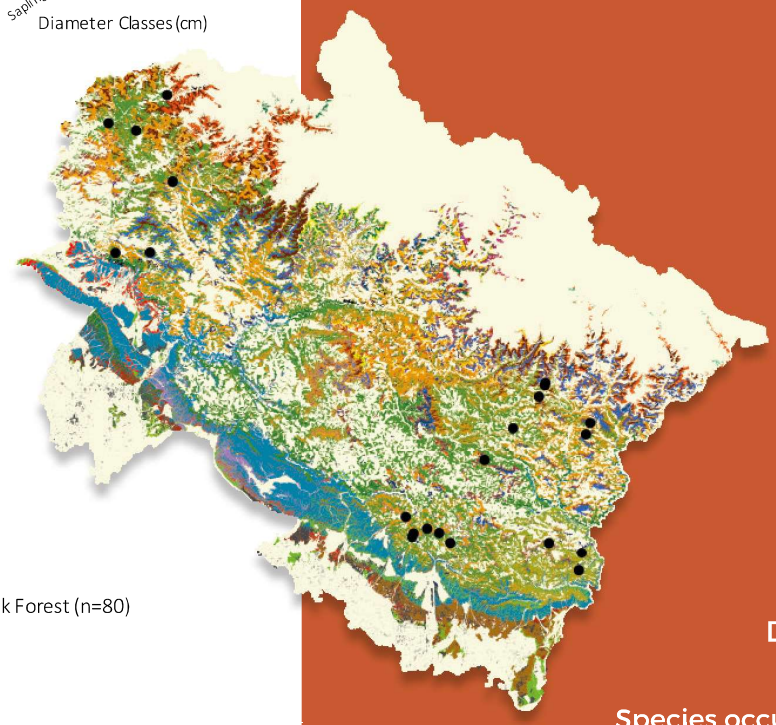
Cornus capitata

Wall. ex Roxb.

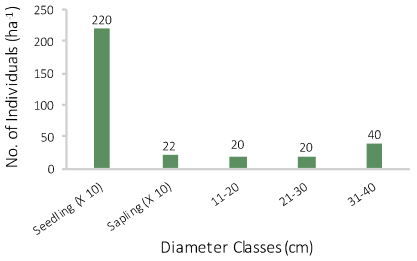
Regeneration Status and Population Structure

12/C1b Moru Oak Forest (n=60)

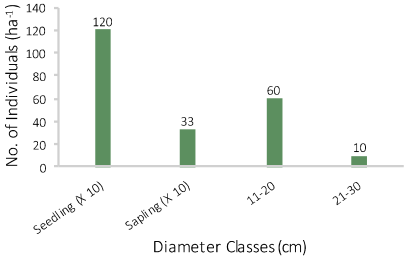




12/C1a Ban Oak Forest (n=80)



9/C1b Upper or Himalayan Chir Pine Forest (n=70)



Distribution in Uttarakhand

Species occurs throughout the hills between 1,500 and 2,300 m.

Occurrence in Forest Types
9/C1a, 9/C1b, 12/C1a, 12/C1b and 12/C2b.

Forest Divisions
Uttarkashi, Chakrata, Bageshwar, Nainital, Mussoorie, Tons, Champawat and Pithoragarh.

The species exhibited overall 'good' regeneration in its distribution range as densities value were in order of: seedlings>saplings>adults. However, proportion of densities of seedlings, saplings and adult trees showed variations. Highest density of seedling being 3,200 ha^{-1} was observed in Moru Oak Forests and lowest value of 1,200 ha^{-1} was in Upper or Himalayan Chir Pine Forest. Sapling density (660 ha^{-1}) was also found higher in Moru Oak Forest. Adult tree population was low in lower diameter classes across two forest types. Species bears beautiful flowers, hence, can be promoted for its aesthetic value. Suitable strategies are required for its conservation and improvement.

Conservation of Forest Genetic Resources

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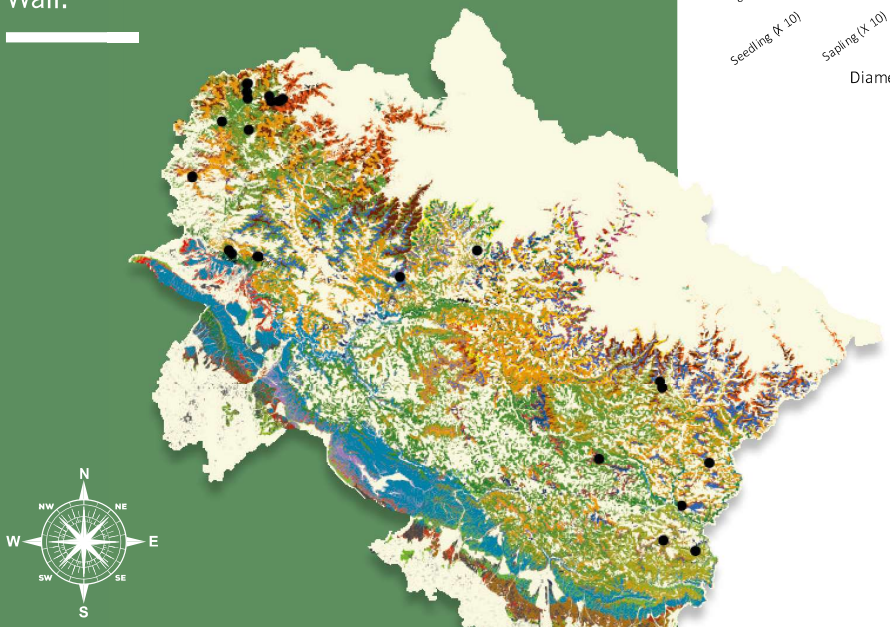
Uttarakhand State

Cornus macrophylla

Wall.



Distribution in Uttarakhand

Species occurs throughout the hills between 1,300 and 2,300 m.

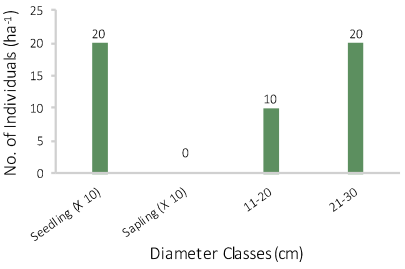
Occurrence in Forest Types
9/C1b, 12/C1a, 12/C1b, 12/C2b and 14/C1b.

Forest Divisions
Mussoorie, Champawat, Pithoragarh, Bageshwar, Chakrata, Tehri Dam–I, Tons, Uttarkashi and Kedarnath Wildlife Division.

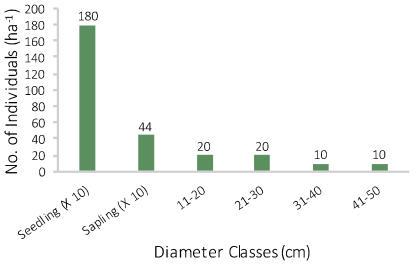
The species depicted 'good' regeneration in Ban Oak Forest and West Himalayan Upper Oak Fir Forest while 'fair' regeneration in West Himalayan Sub-alpine Birch Fir Forest. However, proportion of densities of seedlings, saplings and adult trees showed variations. Highest seedling density1800 ha^{-1} was observed in West Himalaya Upper Oak Fir Forest and lowest 200 ha^{-1} was in West Himalayan Sub-Alpine Birch Fir Forest. Similar trends were observed in sapling and adult tree stages. Highest adult tree density 60 ha^{-1} was also observed in West Himalaya Upper Oak Fir Forest. Adult tree density was less indicating low gene pool of the species. Hence, suitable management strategies are to be developed for its conservation and improvement.

Regeneration Status and Population Structure

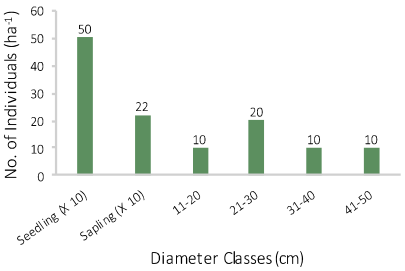
14/C1b West Himalayan Sub- Alpine Birch Fir Forest (n=30)



12/C2b West Himalayan Upper Oak Fir Forest (n=60)



12/C1a Ban Oak Forest (n=50)



Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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Uttarakhand State

Corylus jacquemontii

Decne.

Distribution in Uttarakhand

Species occurs along the mail Himalayan Range between 2,100 m and 2,800 m.

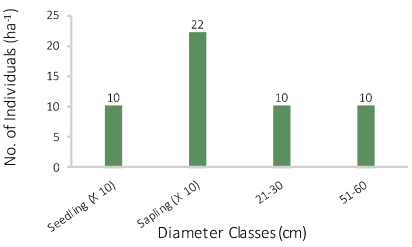
Occurrence in Forest Types
12/C2a, 12/C2b, 14/C1b and 14/1S2.

Forest Divisions
Uttarkashi, Badrinath and Chamoli.

'Fair' regeneration of the species was observed in its natural range. Density values of seedlings and saplings recorded were: 100 ha^{-1} and 220 ha^{-1}, respectively. Density of adult trees was observed less. An important high altitude species and has very low scattered population. Hence, suitable management strategies are required for its conservation.

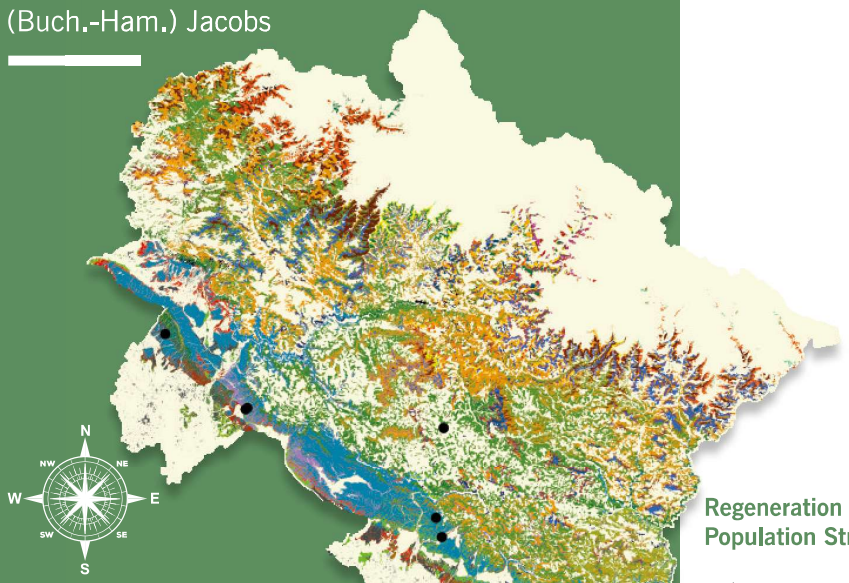
Regeneration Status and Population Structure

14/1S2 Deciduous Sub- Alpine Scrub (n=20)



Crateva adansonii sub sp. *odora*

(Buch.-Ham.) Jacobs



Distribution in Uttarakhand

Species occurs in the Sub-Himalayan tract up to 600 m.

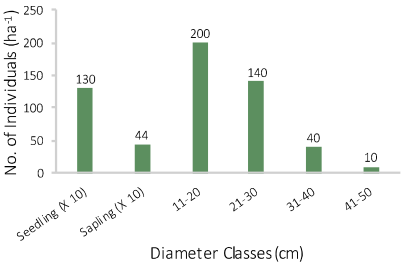
Occurrence in Forest Types
3C/C2a, 3C/C3a, 5B/C1a and 5B/C2.

Forest Divisions
Ramnagar and Lansdowne.

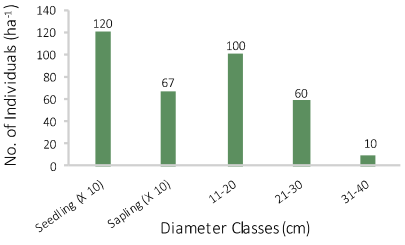
'Good' regeneration of the species in its natural range was observed as values of densities were in order of: seedlings>saplings<adults. Values of seedling density of 1,300 ha^{-1} and 1,200 ha^{-1} were recorded in Northern Dry Mixed Deciduous Forest and West Gangetic Moist Mixed Deciduous Forest, respectively. Sapling density of 670 ha^{-1} was higher in West Gangetic Moist Mixed Deciduous Forest. Adult tree density values of 390 ha^{-1} and 170 ha^{-1} were observed in Northern Dry Mixed Deciduous Forest and West Gangetic Moist Mixed Deciduous Forest, respectively. Higher numbers of individual trees were in the lower and middle diameter classes. Distributed in isolated patches in Haridwar Forest Division. Gene pool was low, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

5B/C2 Northern Dry Mixed Deciduous Forest (n=390)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=170)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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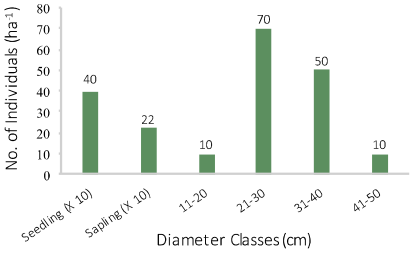
Pilot Project

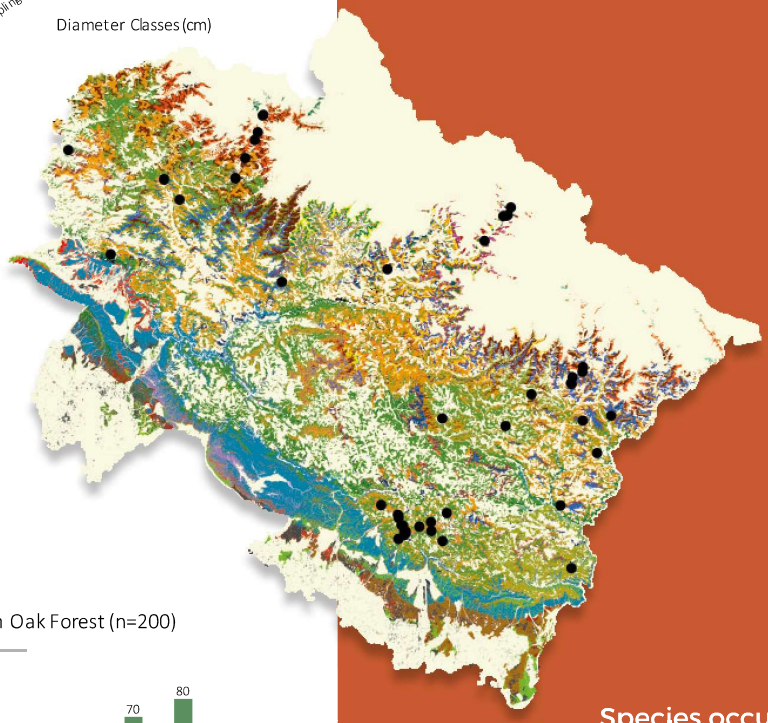
Cupressus torulosa

D. Don

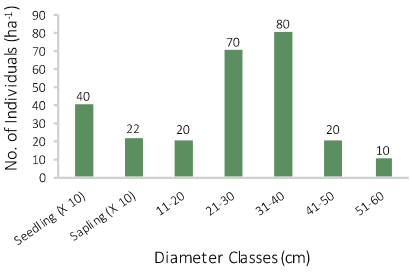
Regeneration Status and Population Structure

12/C1c Moist Deodar Forest (n=140)

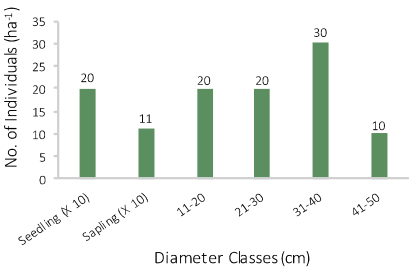




12/C1a Ban Oak Forest (n=200)



12/C1b Moru Oak Forest (n=80)



Distribution in Uttarakhand

Species occurs throughout the hills between 1,800 m and 2,900 m either wild or planted.

Occurrence in Forest Types
9/C1b, 12/C1a, 12/C1b, 12/C1c, 12/C2b and 14/C1b.

Forest Divisions
Mussoorie, Uttarkashi, Bageshwar, Nainital, Rudraprayag, Pithoragarh, Chamoli, Chakrata and Nanda Devi National Park.

Overall regeneration status of the species was 'good'. The proportion of the seedlings, saplings and adults showed variations across the forest types. Seedling and saplings densities of 400 ha^{-1} and 220 ha^{-1} were estimated in Moist Deodar Forest and Ban Oak Forest, respectively while 200 ha^{-1} and 110 ha^{-1} were in Moru Oak Forest. Higher adult tree densities of lower and medium diameter classes were observed in all forest types. Highest adult density of 200 ha^{-1} was observed in Ban Oak Forest. Gene pool of species was low, hence, suitable management strategies are required for its improvement and conservation.

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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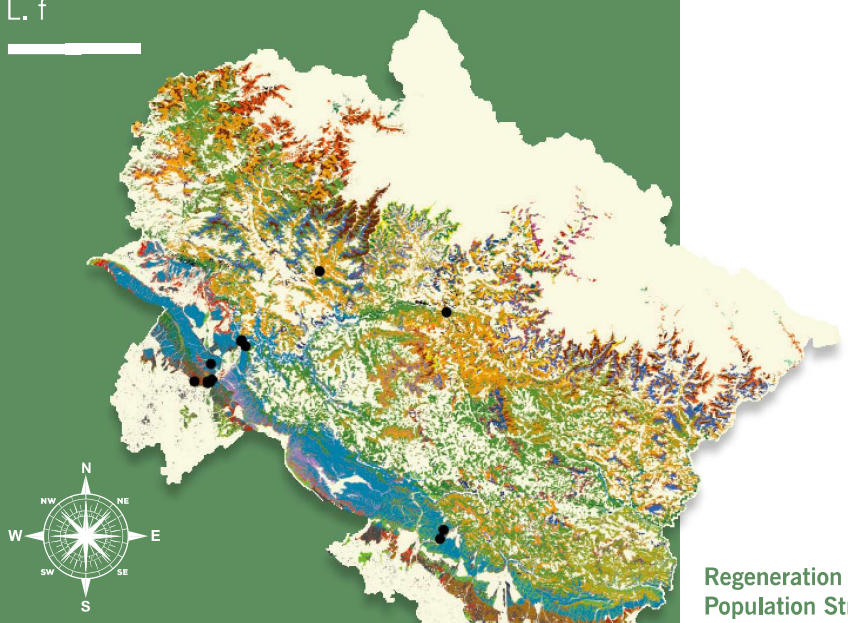
Uttarakhand State

Dalbergia lanceolaria

L. f



Distribution in Uttarakhand

Species occurs throughout the area between 600-1,600 m. Almost always found growing on the banks of streams, or less frequently on landslips.

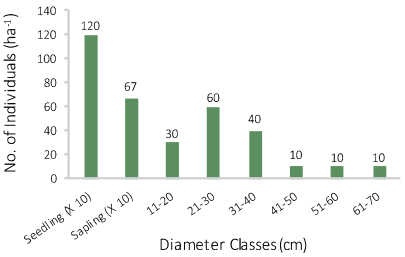
Occurrence in Forest Types
3C/C2a, 3C/C3a, 5B/C2, 5/1S2 and 12/C1a.

Forest Divisions
Terai East, Ramnagar, Badrinath, Tehri Dam–I, Narendranagar, Pithoragarh, Lansdowne and Rajaji Tiger Reserve.

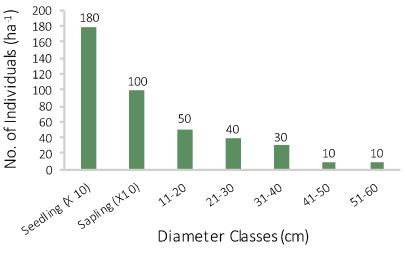
Overall regeneration status of the species in its natural distribution range was 'good'. However, proportion of different stages showed variations. Seedling density was estimated as 1,800 ha^{-1} and 1,200 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest and Moist Shiwalik Sal Forest, respectively. Sapling density was estimated as 1,000 ha^{-1} for West Gangetic Moist Mixed Deciduous forest while value of 670 ha^{-1} was estimated for Moist Shiwalik Sal Forest. Contribution of lower and middle diameter classes was high in adult tree population. Gene pool was narrow, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

3C/C2a Moist Shiwalik Sal Forest (n=160)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=140)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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Pilot Project

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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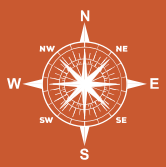
Uttarakhand State

Dalbergia latifolia

Roxb.



Distribution in Uttarakhand

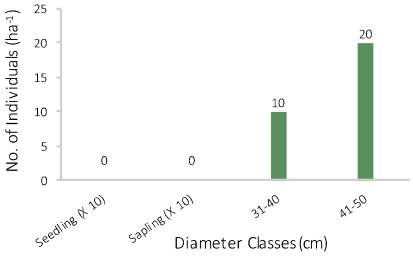
Species is a new record for Uttarakhand.

Occurrence in Forest Types
3C/C3a.

Forest Divisions
Haridwar.

Regeneration Status and Population Structure

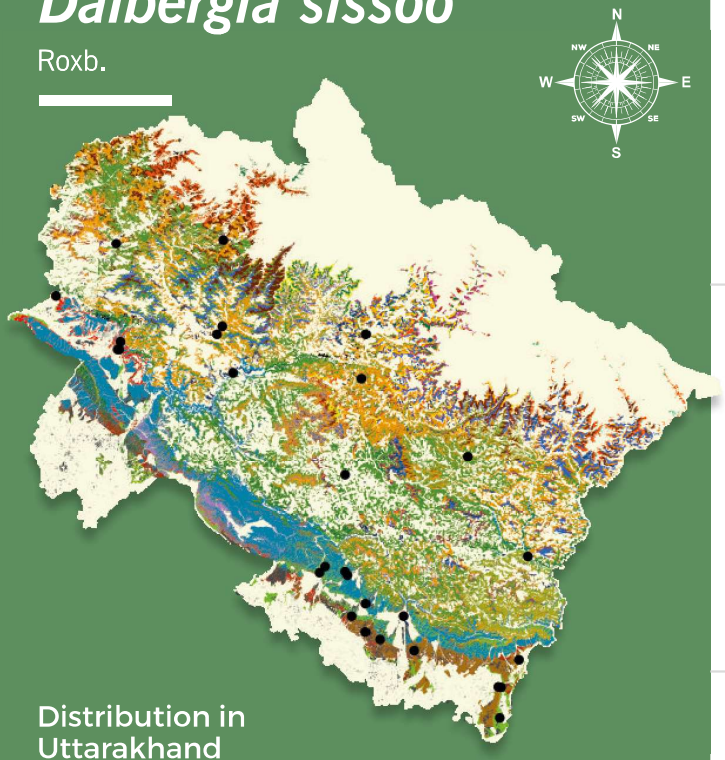
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=30)



'No' regeneration was exhibited by the species in the present. Ten adult trees were observed in diameter class of 31-40 cm and twenty individuals in 41-50 cm. Problem in occurrence of seedlings and establishment of saplings is matter of great concern for future sustainability of the species. Hence, a comprehensive study needs to be carried out for finding causes of non- availability of seedlings and saplings. Hence, suitable strategies are urgently required for its conservation.

Dalbergia sissoo

Roxb.



Distribution in Uttarakhand

Species occurs in the areas up to 1,000 m. It is a gregarious species characteristic of riverine tracts and is seldom found away from the banks of rivers and streams.

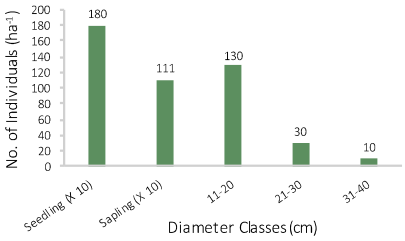
Occurrence in Forest Types
Plantations, 3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/DS1, 5/1S2 and 9/C1a.

Forest Divisions
Terai East, Pithoragarh, Ramnagar, Uttarkashi, Bageshwar, Mussoorie, Nand Prayag, Tehri, Upper Yamuna, Chakrata, Narendranagar, Dehra Dun, Haldwani, Kalsi Soil Conservation, Terai Central and Tons

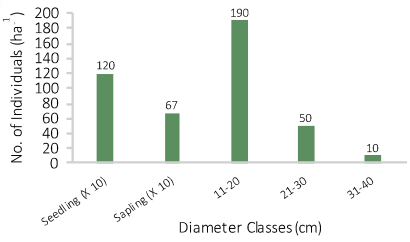
The species exhibited overall 'good' regeneration. However, proportion of seedlings, saplings and adults showed variations. Highest seedlings density 2,200 ha^{-1} was observed in Moist Terai Sal Forest. However, highest sapling and adult tree densities of 670 ha^{-1} and 250 ha^{-1}, respectively were recorded in West Gangetic Moist Mixed Deciduous Forest. Lower and middle diameter classes contributed higher densities in the adult population. It is an important timber species. Hence, suitable strategies are required for conservation of superior material for future improvement programme.

Regeneration Status and Population Structure

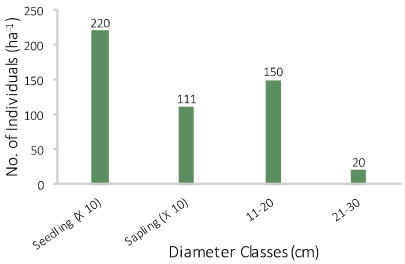
5B/C2 Northern Dry Mixed Deciduous Forest (n=170)



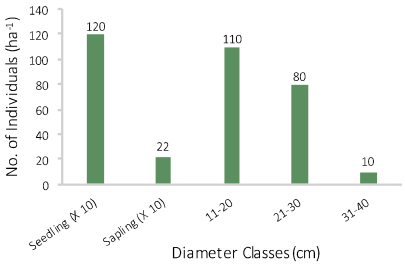
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=250)



3C/C2c Moist Terai Sal Forest (n=170)



5/1S2 Khair- Sissoo Forest (n=200)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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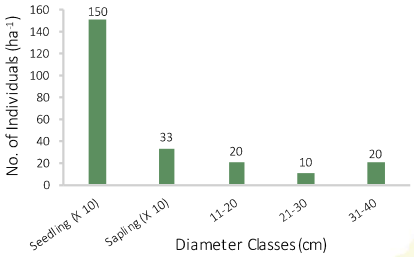
Pilot Project

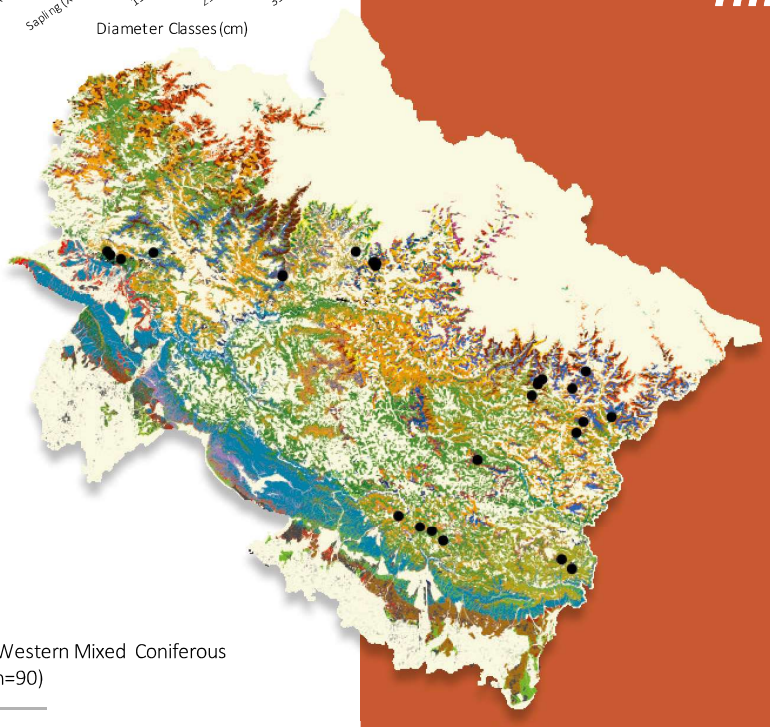
Daphniphyllum himalayense

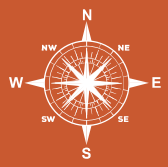
(Benth.) Müll.

Regeneration Status and Population Structure

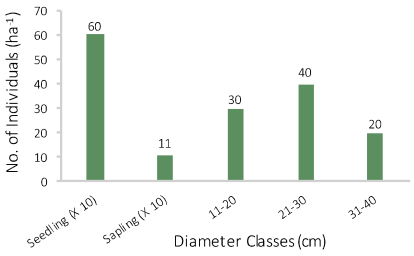
12/C1a Ban Oak Forest (n=50)



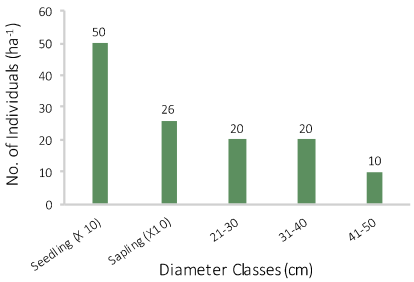




12/C1d Western Mixed Coniferous Forest (n=90)



12/C1b Moru Oak Forest (n=50)



Species occurs throughout the hills up to 1500 m and 2500 m. It is found in moist shady forests and in deep ravines.

Occurrence in Forest Types
12/C1a, 12/C1b, 12/C1c, 12/C1d and 12/C2b.

Forest Divisions
Ramnagar, Mussoorie, Bageshwar, Rudraprayag, Pithoragarh, Champawat and Kedarnath Wildlife Division.

Overall regeneration status of the species was 'good'. Highest seedling density of 1,500 ha^{-1} was recorded in Ban Oak Forest and while lowest value of 500 ha^{-1} in Moru Oak Forest. However, sapling's highest density of 330 ha^{-1} was recorded in Moru Oak Forest indicating better establishment from seedlings. Adult tree density was low and majority of it was from lower diameter classes. Species is scatteredly distributed in the temperate region and has low gene pool, hence, suitable measures are required for its conservation.

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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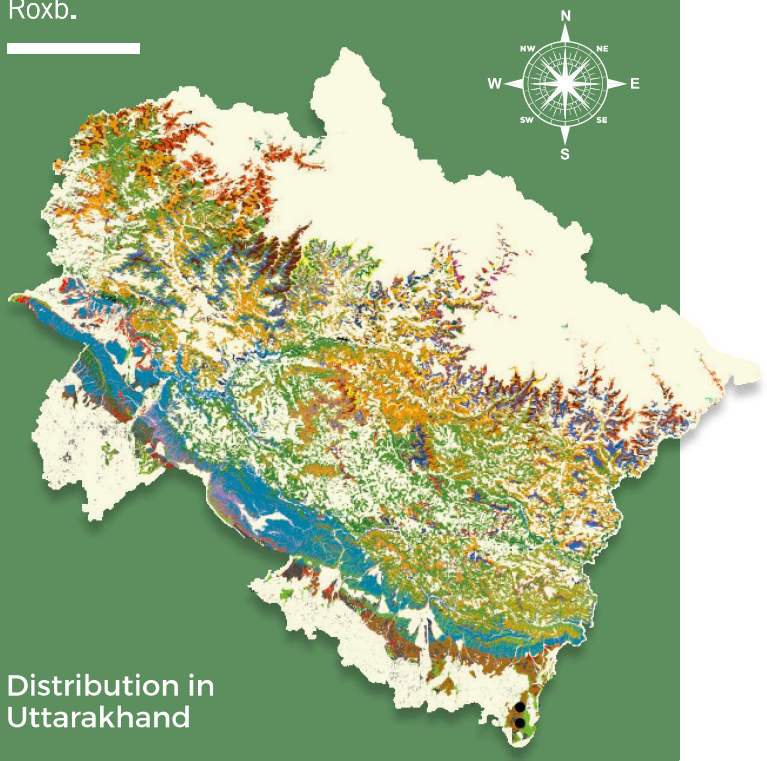
Uttarakhand State

Dillenia pentagyna

Roxb.



Distribution in Uttarakhand

Species occurs in restricted area of the Surai Range, western moist limit in East Terai.

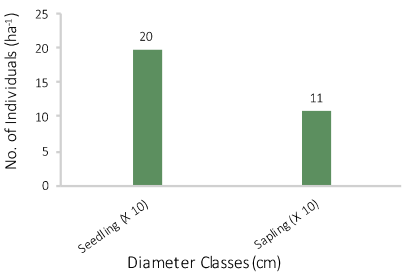
Occurrence in Forest Type
3C/C2c

Forest Division
East Terai

Species exhibited 'new' regeneration as species observed only in seedling and sapling stage. It is also a new record for Uttarakhand. Species bears beautiful flowers, hence, suitable strategies are required for its conservation and for promotion as potential ornamental tree.

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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Pilot Project

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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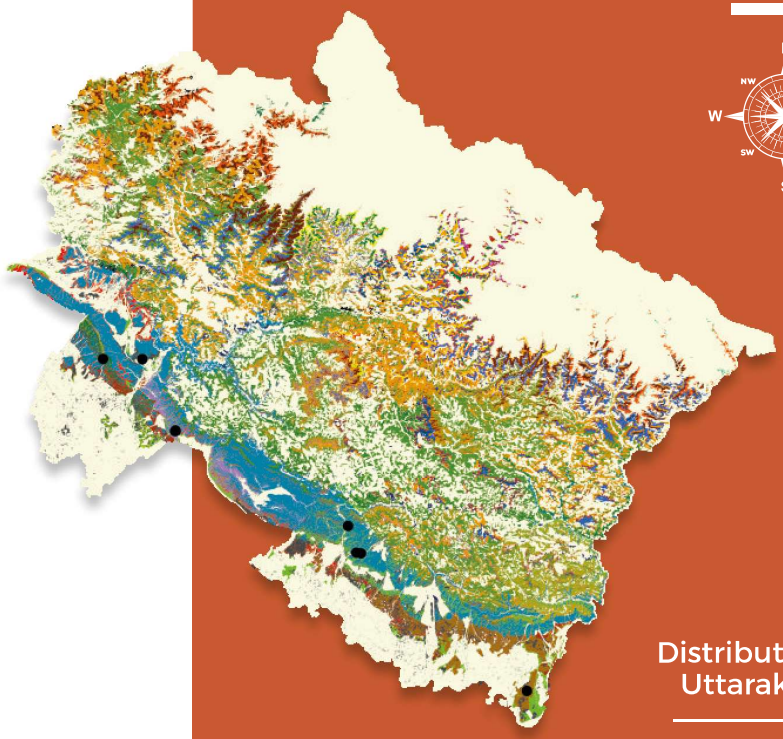
Uttarakhand State

Diospyros melanoxylon

Roxb var. *tupru* (Buch.-Ham.) V. Singh



Distribution in Uttarakhand

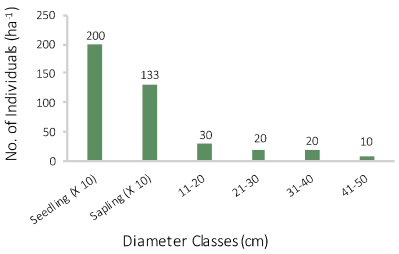
Species occurs throughout the Sub-Himalayan tract up to 900 m. Common in open Sal forests especially on clay soils.

Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, and 5/DS1.

Forest Divisions
Ramnagar, Terai West, Terai East, Lansdowne, Dehra Dun and Kalsi Soil Conservation Division.

Regeneration Status and Population Structure

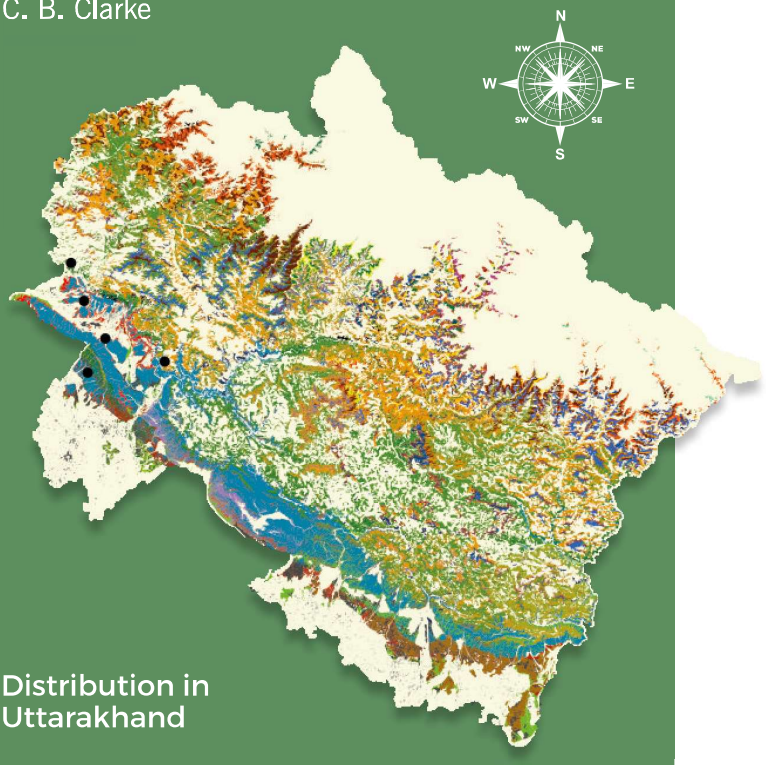
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=80)



The species exhibited 'good' regeneration. Density values of 2,000 ha^{-1}, 1,330 ha^{-1} and 80 ha^{-1} were observed for seedlings, saplings and adult trees, respectively. Total adult individuals 80 ha^{-1} were reported from the area which indicated low recruitment of saplings into adult trees. Higher number of adult individuals was confined to lower diameter classes. Species is very important economically for its leaves, hence, suitable management strategies are required for its conservation.

Diospyros montana

C. B. Clarke



Distribution in Uttarakhand

Species occurs along the Outer or Shiwalik Range between 300-1,300 m in dry miscellaneous Forest.

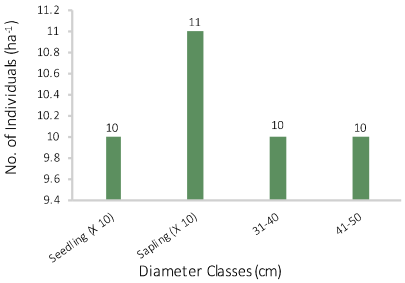
Occurrence in Forest Type
3C/C2a, 5B/C1a, and TOF

Forest Division
Chakrata, Dehra Dun, Kalsi and Narendranagar.

'Fair' regeneration of the species was observed as density values were in order of seedling ≤ saplings > adults. Density values of seedlings, saplings and adult trees were recorded at 100 ha^{-1}, 110 ha^{-1} and 20 ha^{-1}, respectively. Adult tree densities were uniformly distributed in 31 cm - 40 cm and 41 cm – 50 cm diameter classes. Population was low in size hence, suitable management strategies are required for its conservation.

Regeneration Status and Population Structure

3C/C2a Moist Shiwalik Sal Forest (n=20)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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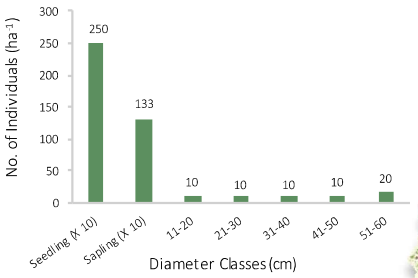
Pilot Project

Diploknema butyracea

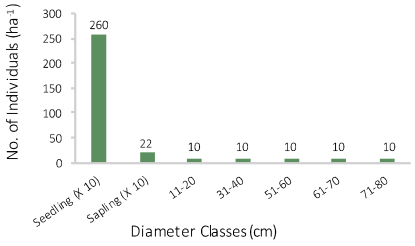
(Roxb.) H. J. Lam.

Regeneration Status and Population Structure

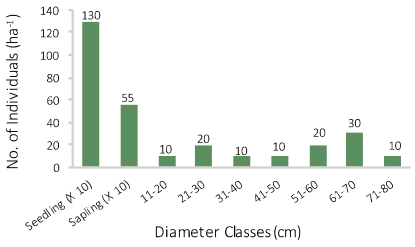
12/C1a Ban Oak Forest (n=60)

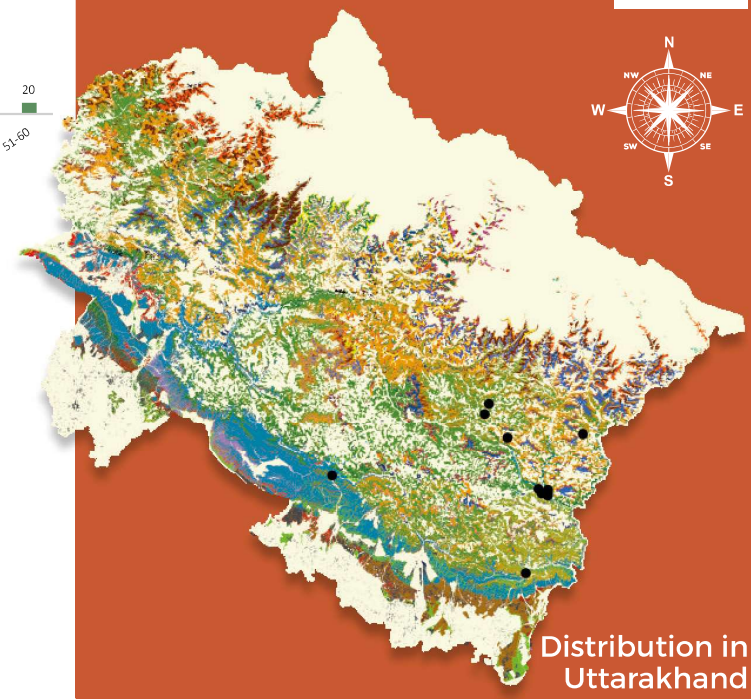


9/C1b Upper or Himalayan Chir Pine Forest (n=50)



9/DS1 Himalayan Subtropical Scrub (n=110)





Distribution in Uttarakhand

Species occurs in the Sub-Himalayan tract up to 1,200 m. Species is also planted in the hills.

Occurrence in Forest Types
5B/C2, 9/C1a, 9/C1b, 9/DS1, 12/C1a and12/C1c

Forest Divisions
Champawat, Pithoragarh, Ramnagar and Bageshwar.

The species depicted 'good' regeneration. Highest seedling density at 2,600 ha^{-1} was estimated in Upper or Himalayan Chir Pine Forest, followed 2,500 ha^{-1} in Ban Oak Forest and 1,300 ha^{-1} in Himalayan Sub-tropical Scrub. In spite of highest seedling density in Upper or Himalayan Chir Pine Forest, establishment to sapling was lowest (220 ha^{-1}). Highest sapling density (1,330 ha^{-1}) was recorded in Ban Oak Forest. Adult trees density at 110 ha^{-1}, 50 ha^{-1}, and 60 ha^{-1} was estimated in Himalayan Sub-tropical Scrub, Upper or Himalayan Chir Pine Forest and Ban Oak Forest, respectively. Species is important for its oil content and scatteredly distributed in the sub-tropical region. Hence, suitable strategies are required to develop for its conservation and improvement.

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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Uttarakhand State

Elaeodendron glaucum

(Rottb.) Pers.

Distribution in Uttarakhand

Species occurs between 900-2,000 m.

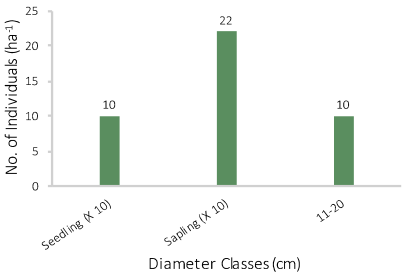
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/1S2, 9/C1b and 12/C1a.

Forest Divisions
Dehra Dun, Chakrata, Rajaji Tiger Reserve, Mussoorie, Tehri, Ramnagar, Haldwani and Rudraprayag.

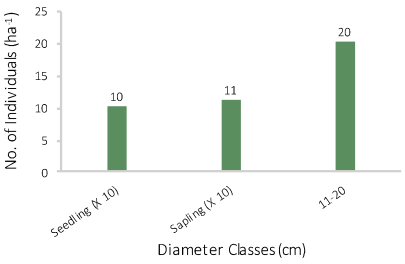
The species exhibited 'good' regeneration in Moist Shiwalik Sal Forest, West Gangetic Moist Mxed Deciduous Forest and Dry Shiwalik Sal Forest. However, in Ban Oak Forest, 'no' regeneration was observed. It is a small tree with scattered populations distributed in the sub-tropical to temperate regions. Therefore, suitable management strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

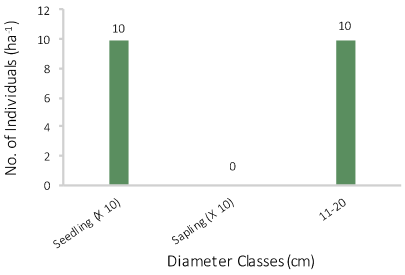
3C/C2a Moist Shiwalik Sal Forest (n=10)



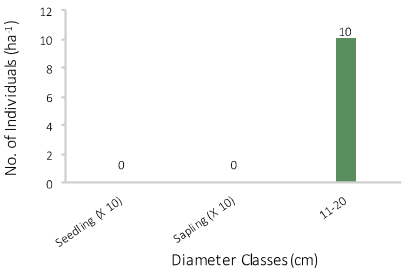
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)

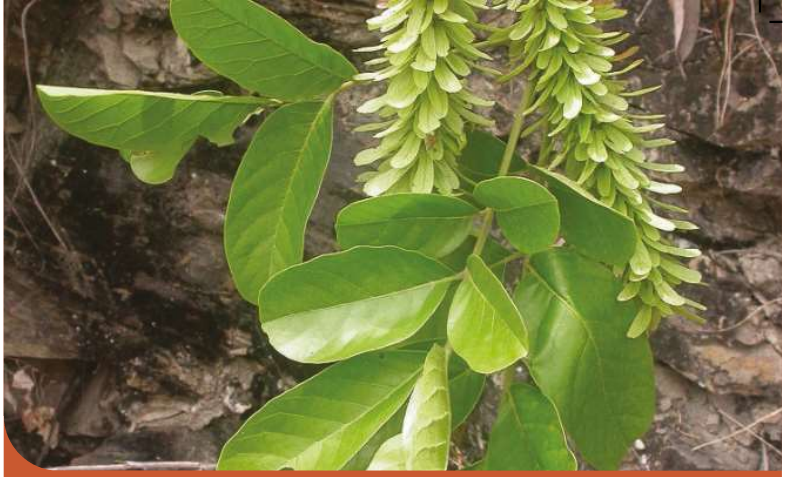


5B/C1a Dry Shiwalik Sal Forest (n=10)



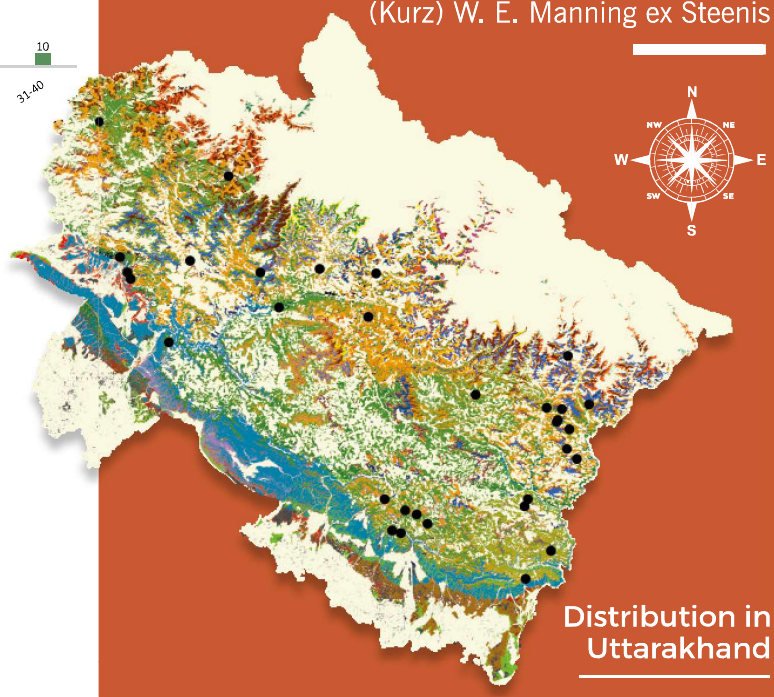
12/C1a Ban Oak Forest (n=10)





Engelhardtia spicata var. *integra*

(Kurz) W. E. Manning ex Steenis



Distribution in Uttarakhand

Species occurs throughout the hills between 600-2,200 m. Common in dry deciduous forests of the Outer or Shiwalik Range, frequently associated with chir.

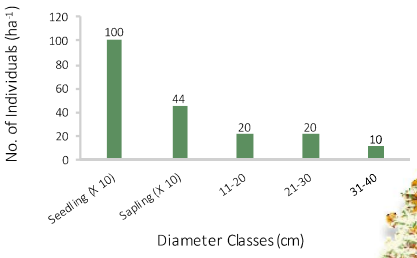
Occurrence in Forest Types
5B/C1a, 5B/C2, 9/C1a, 9/C1b, 12/C1a, 12/C1b, 12/C1c, 12/C1e, and 12/1S1.

Forest Divisions
Champawat, Uttarkashi, Govind Pashu Vihar, Mussoorie, Nainital, Pithoragarh, Almora, Rudraprayag, Bageshwar, Tehri, Tehri Dam-1, Kedarnath Wildlife sanctuary, Lansdowne, Tons, Chakrata and Alaknanda.

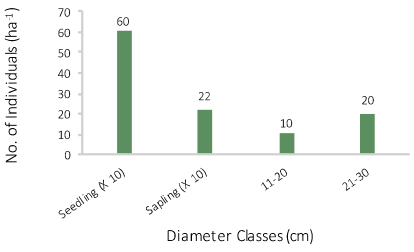
The species depicted overall 'good' regeneration. Highest seedling density of 1,000 ha^{-1} was estimated in Upper or Himalayan Chir Pine Forest while it was 600 ha^{-1} in both Northern Dry Mixed Deciduous Forest and Ban Oak Forest. Similar trend was recorded in saplings and adult trees. Density value of 50 ha^{-1} was observed in Upper or Himalayan Chir Pine Forest. Adult tree populations were quite low in all forest types, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

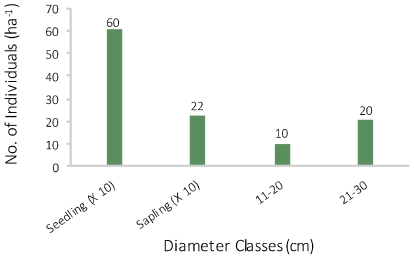
9/C1b Upper or Himalayan Chir Pine Forest (n=50)



5B/C2 Northern Dry Mixed Deciduous Forest (n=30)

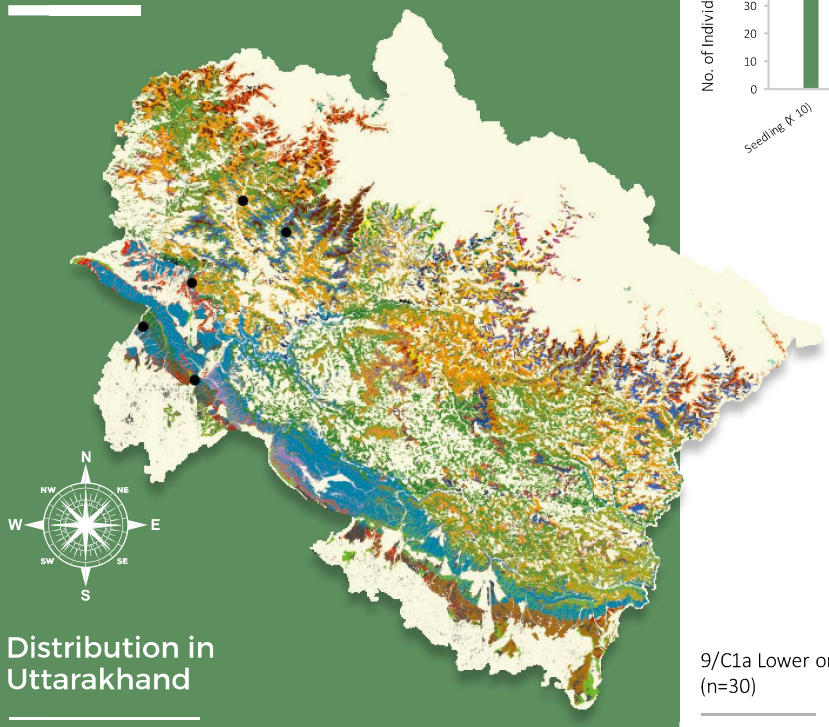


12/C1a Ban Oak Forest (n=30)



Erythrina suberosa

Roxb.



Distribution in Uttarakhand

Species occurs throughout the hills between 1,200-2,200 m.

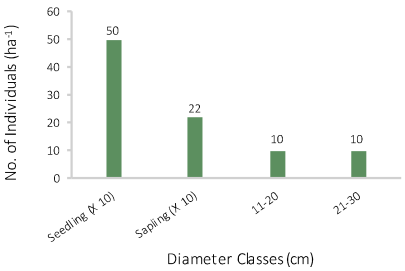
Occurrence in Forest Types
5B/C1a, 5/1S2, 9/C1a and 9/C1b.

Forest Divisions
Uttarkashi, Dehra Dun, Tehri and Mussoorie.

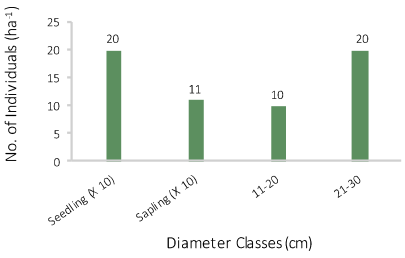
The species exhibited 'good' regeneration in Lower or Shiwalik Chir Pine Forest and Dry Shiwalik Sal Forest. However, in Khair Sissoo Forest, regeneration was depicted 'poor' as there was no individual observed in seedling stage. Seedling density of 500 ha^{-1} and 200 ha^{-1} and sapling density of 220 ha^{-1} and 110 ha^{-1} were estimated for Dry Shiwalik Sal Forest and Lower or Shiwalik Chir Pine Forest, respectively. Values of adult trees density of 30 ha^{-1}, 20 ha^{-1} and 10 ha^{-1} were reported in Lower or Shiwalik Chir Pine Forest, Dry Shiwalik Sal Forest and Khair Sissoo Forest, respectively. Adult tree population was small, hence, suitable strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

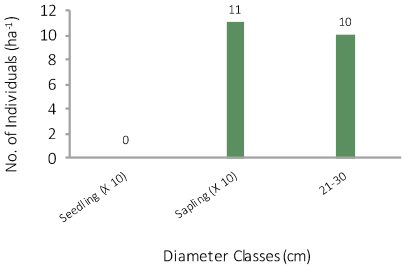
5B/C1a Dry Shiwalik Sal Forest (n=20)



9/C1a Lower or Shiwalik Chir Pine Forest (n=30)



5/1S2 Khair Sissoo Forest (n=10)



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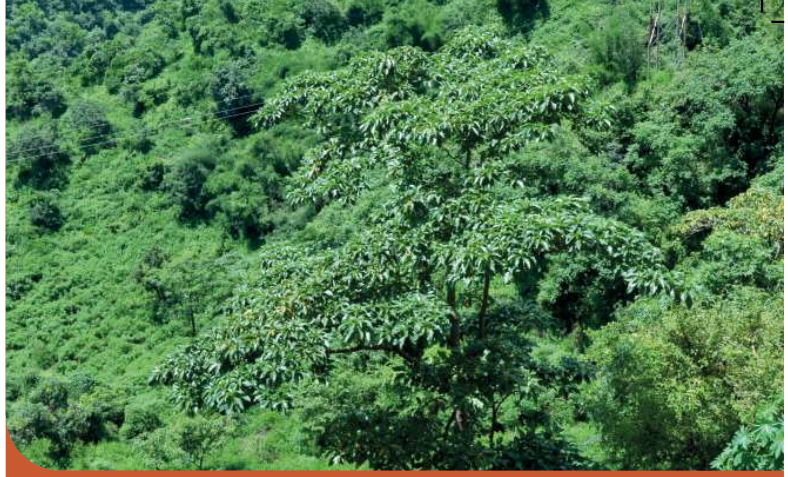
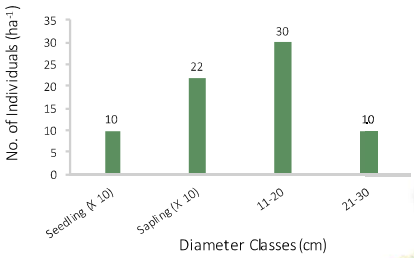
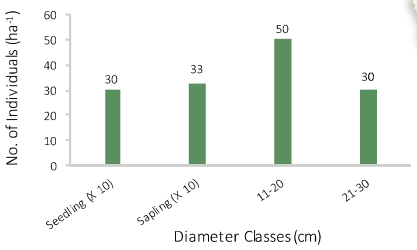


Regeneration Status and Population Structure

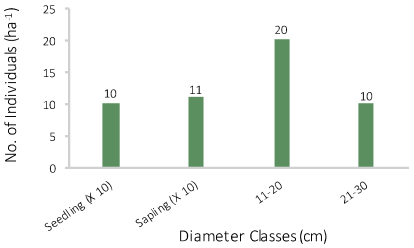
5B/C2 Northern Dry Mixed Deciduous Forest (n=40)



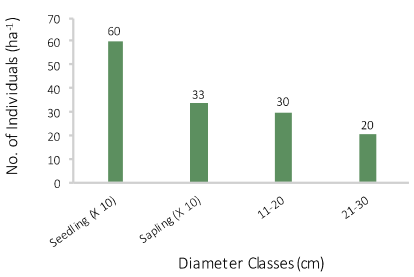
9/C1a Lower or Shiwalik Chir Pine Forest (n=80)



9/C1b Upper or Himalayan Chir Pine Forest (n=30)

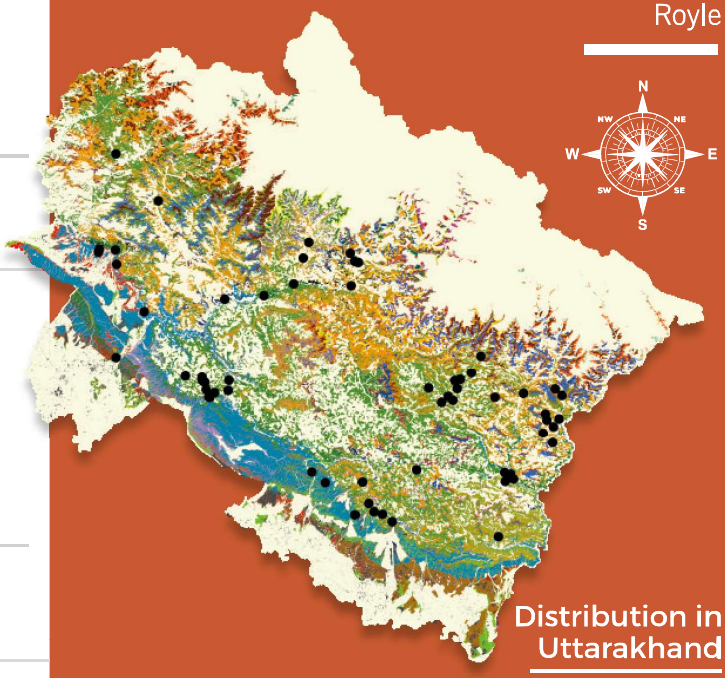


12/C1a Ban Oak Forest (n=50)



Falconeria insignis

Royle



Distribution in Uttarakhand

Species occurs throughout the area up to 2,000 m. Common in open miscellaneous forest and thrives well in loose rocks or on steep rocky ground.

Occurrence in Forest Types

3C/C2a, 3C/C3a, 5B/C1a, 5B/C2, 5/1S2, 9/C1a, 9/C1b, 9/DS1, 12/C1a, 12/C1b, 12/C1c and 12/C1d.

Forest Divisions

Champawat, Mussoorie, Chakrta, Kalsi Soil Conservation, Tons, Pauri, Uttarkashi, Bageshwar, Haridwar, Haldwani, Pithoragarh, Alaknanda Soil Conservation, Nainital, Almora, Terai East, Kedarnath Wildlife Sanctuary, Narendranagar and Rudraprayag.

The species exhibited 'fair' regeneration in Northern Dry Mixed Deciduous Forest, Lower or Shiwalik Chir Pine Forest and Upper or Himalayan Chir Pine Forest while 'good' regeneration in Ban Oak Forest was observed. Seedling density was reported at 600 ha^{-1} in Ban Oak Forest, 300 ha^{-1}in Lower or Shiwalik Chir Pine Forest and 100 ha^{-1} in Northern Dry Mixed Deciduous Forest and Upper or Himalayan Chir Pine Forest. Except in Ban Oak Forest, where sapling density of 330 ha^{-1} was observed, all other forest types recorded higher density values of saplings than seedlings. Low density of seedling reflected disturbances in the area. Highest adult tree density of 80 ha^{-1} was observed in Lower or Shiwalik Chir Pine Forest and lowest density of 30 ha^{-1} was in Upper or Himalayan Chir Pine Forest. Overall adult tree population was scanty, hence, suitable measures are required for its conservation and improvement.

Ficus auriculata

Lour.

Distribution in Uttarakhand

Species occurs in Sub-Himalayan tract and outermost hill ranges up to 1,200 m. Planted throughout hills up to 1,500 m.

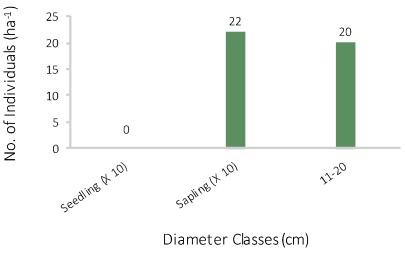
Occurrence in Forest Types
3C/C2a, 3C/C3a, 5B/C1a, 5B/C2, 9/C1a, 9/C1b, 9/DS2, 12/C1a, 12/C1b and 12/C2c

Forest Divisions
Champawat, Chakrata, Dehra Dun, Mussoorie, Tons, Rajaji Tiger Reserve, Pithoragarh, Uttarkashi, Bageshwar, Nainital, Almora, Upper Yamuna, Rudraprayag, Tehri, Tehri Dam –I, Lansdowne, Ramnagar, Haldwani, and Kedarnath Wildlife Division.

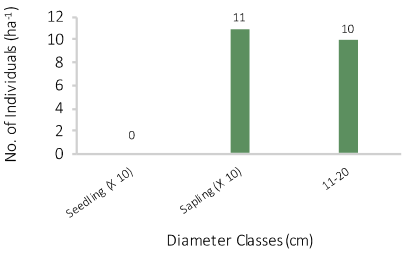
The species depicted overall 'poor' regeneration as there was no seedlings stage except in Dry Shiwalik Sal Forest where 'good' regeneration was exhibited. In this forest type, seedling density of 300 ha^{-1} was estimated. Poor establishment of seedling reflected disturbance in the area. Saplings density of 110 ha^{-1} was reported in all assessed forest types except in Sub-tropical Euphorbia Scrub where it was 220 ha^{-1}. Adult population density was very low with maximum value of 20 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest and Sub-tropical *Euphorbia* Scrub. It is an important food and fodder species and scatteredly distributed in the sub-tropical and temperate regions. Hence, suitable strategies are required for its improvement and conservation.

Regeneration Status and Population Structure

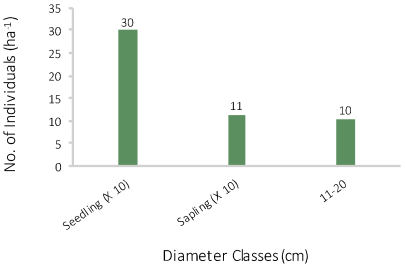
9/DS2 Subtriopical Euphorbia Scrub (n=20)



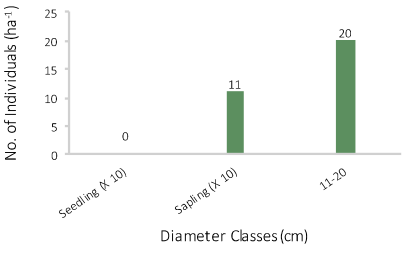
9/C1b Upper or Himalayan Chir Pine Forest (n=10)



5B/C1a Dry Shiwalik Sal Forest (n=10)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)



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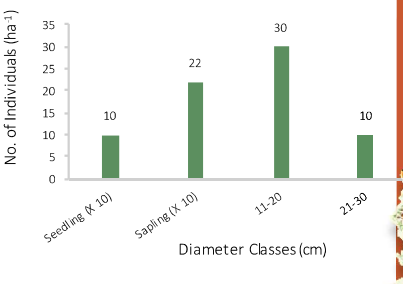
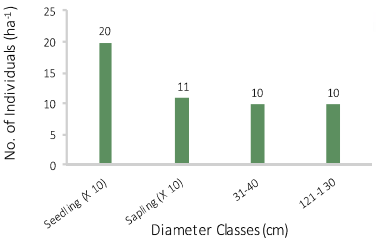
Ficus benghalensis L.

Regeneration Status and Population Structure

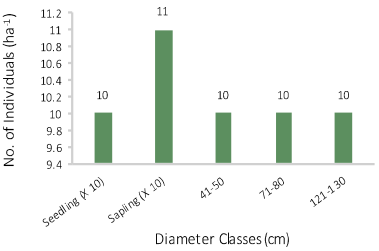
5B/C2 Northern Dry Mixed Deciduous Forest (n=40)



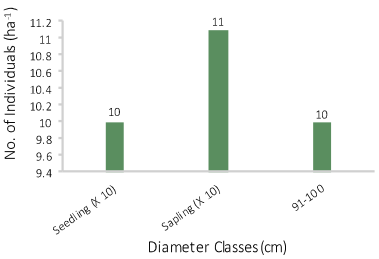
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)

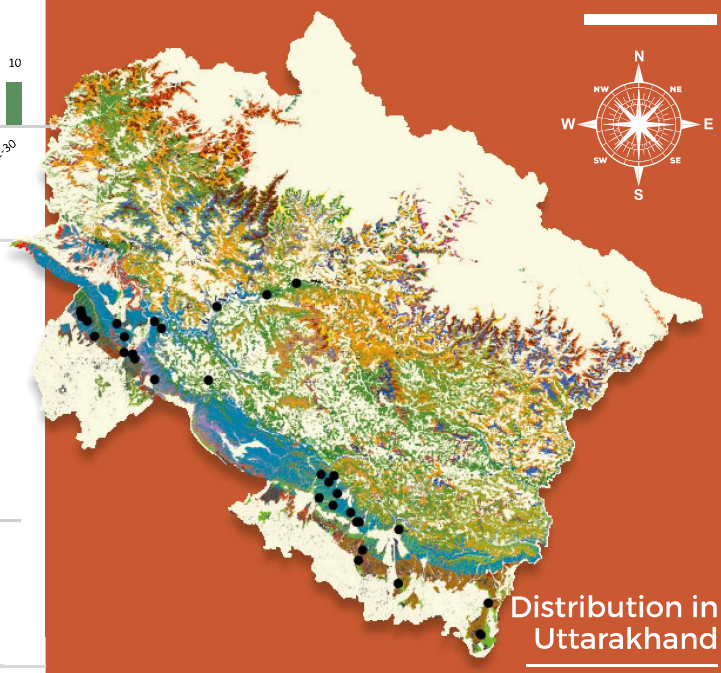


3C/C2a Moist Shiwalik Sal Forest (n=30)



3C/C2c Moist Terai Sal Forest (n=10)





Distribution in Uttarakhand

Species occurs throughout up to 1,200 m. Common in the Sub-Himalayan tract.

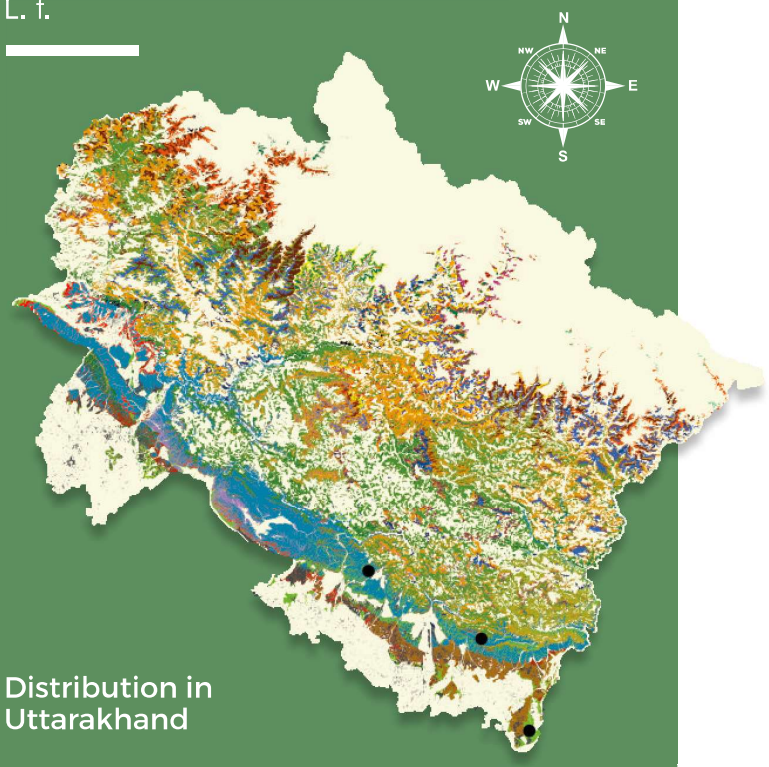
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5/DS1, 5B/C2, 5/1S2, 9/C1b, 9/DS1 and 12/C2b

Forest Divisions
Dehra Dun, Kalsi Soil Conservation, Terai West, Terai East, Terai Central, Haridwar, Haldwani, Ramnagar, Narendranagar, Lansdowne, Uttarkashi, Tons, Champawat, Pithoragarh, and Rajaji Tiger Reserve.

The species exhibited 'fair' regeneration in all assessed forest types except in West Gangetic Moist Mixed Deciduous Forest where 'good' regeneration was observed. Seedling density of 200 ha^{-1} was observed in West Gangetic Moist Mixed Deciduous Forest and Northern Dry Mixed Deciduous Forest while it was 100 ha^{-1} in Moist Terai Sal Forest and Moist Shiwalik Sal Forest. Sapling density of 110 ha^{-1} was observed in all assessed forest types except Northern Dry Mixed Deciduous Forest where no sapling stage was observed. Adult population was meagre with a maximum density of 30 ha-1 in Moist Shiwalik Sal Forest. This species is ecologically very important for bird nesting and as feed, hence, suitable strategies are required to be developed for its conservation.

Ficus microcarpa

L. f.



Distribution in Uttarakhand

Species occurs upto 900 m in the Terai.

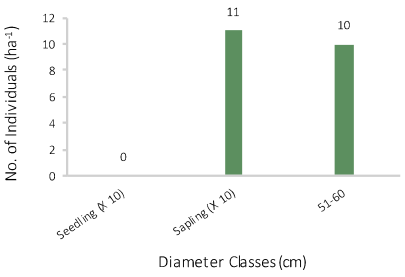
Occurrence in Forest Types
3C/C2c

Forest Divisions
Terai East, Ramnagar and Nandhaur Wildlife Sanctuary.

The species exhibited 'poor' regeneration as there were no seedlings in the area. Sapling and adult tree densities of 110 ha^{-1} and 10 ha^{-1} were observed, respectively. This is ecologically important species for bird nesting and as feed, hence, appropriate strategies are required for its conservation.

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=10)



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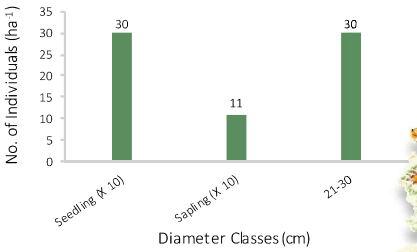
Ficus neriifolia

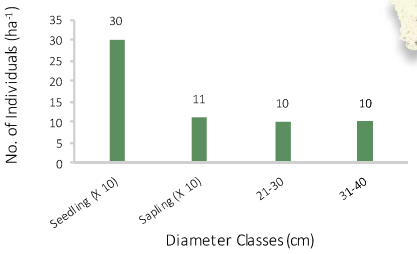
J. E. Sm.

Regeneration Status and Population Structure

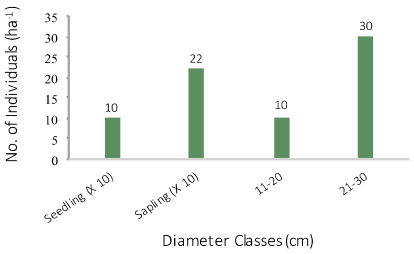
9/C1b Upper or Himalayan Chir Pine Forest (n=30)



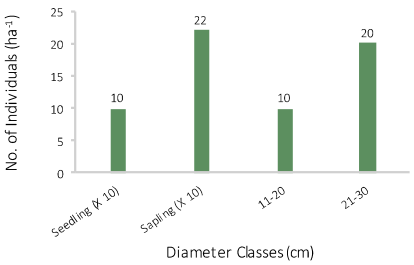
12/C1d Western Mixed Coniferous Forest (n=40)

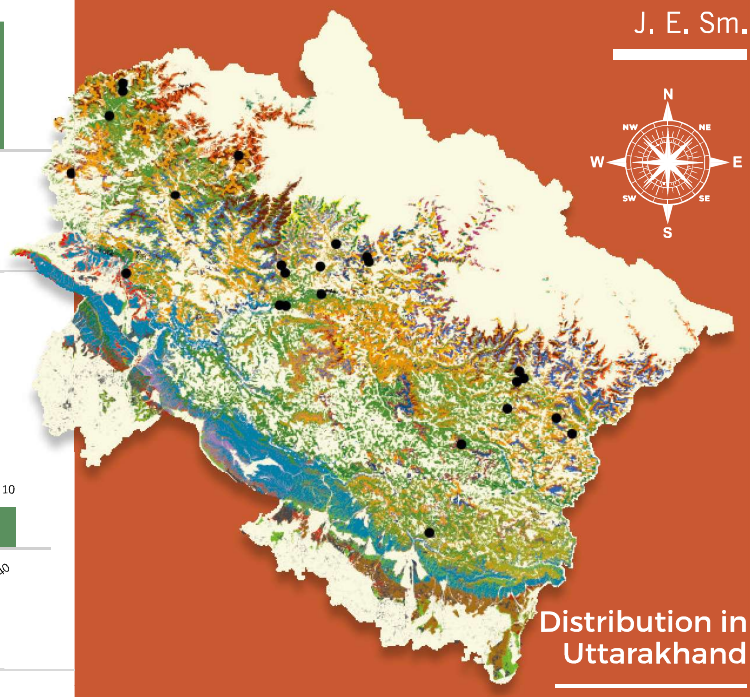


12/C1e Moist Temperate Deciduous Forest (n=40)



12/C1a Ban Oak Forest (n=30)





Distribution in Uttarakhand

Species occurs throughout the hills between 1,200-2,000 m, usually in oak forest.

Occurrence in Forest Types

5B/C1a, 5B/C2, 5/1S2, 9/C1b, 12/C1a, 12/C1d, 12/C1e and 12/C2b.

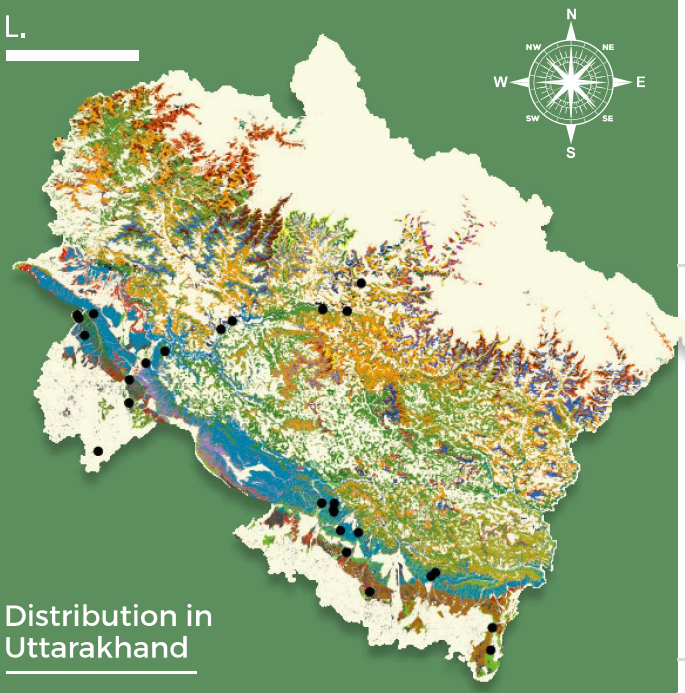
Forest Divisions

Uttarkashi, Mussoorie, Bageshwar, Almora, Tons, Nainital, Pithoragarh, Chakrata, Rudraprayag, Govind Pashu Vihar National Park and Kedarnath Wildlife Division.

The species exhibited 'fair' regeneration in Ban Oak Forest and Moist Temperate Deciduous Forest while 'good' regeneration was observed in Western Mixed Coniferous Forest and Upper or Himalayan Chir Pine Forest. Seedling density value of 300 ha^{-1} was observed in Western Mixed Coniferous Forest and Upper or Himalayan Chirpine Forest while it was 100 ha^{-1} in Ban Oak Forest and Moist Temperate Deciduous Forest. However, saplings density value of 220 ha^{-1} was observed in Ban Oak Forest, and Moist Temperate Deciduous Forest and 110 ha^{-1} Western Mixed Coniferous Forest and Upper or Himalayan Chir Pine Forest. Highest adult trees density value of 40 ha^{-1} was observed in Western Mixed Coniferous Forest. This species is economically very important for its fodder value, hence, appropriate strategies are required to be developed for its conservation and biomass improvement.

Ficus racemosa

L.



Distribution in Uttarakhand

Species occurs in the Sub-Himalayan tract and other hill ranges up to 900 m. Common in moist localities and bordering streams.

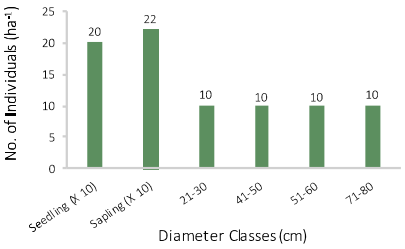
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C2d, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2, 9/C1a, and 12/C2b.

Forest Divisions
Dehra Dun, Chakrata, Tons, Mussoorie, Haridwar, Lansdowne, Pauri Garhwal, East Terai, West Terai, Central Terai, Haldwani, Champawat, Bageshwar, Pithoragarh, Ramnagar, Kalsi Soil Conservation and Rajaji Tiger Reserve.

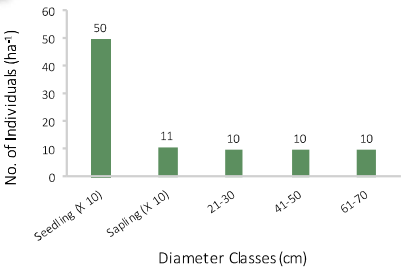
The species showed 'good' regeneration in Moist Terai Sal Forest and Moist Shiwalik Sal Forest while 'fair' regeneration in Northern Dry Mixed Deciduous Forest and 'poor' regeneration in West Gangetic Moist Mixed Deciduous Forest were observed. Highest seedling density of 500 ha^{-1} was estimated in Moist Terai Sal Forest. Sapling density of 220 ha^{-1} observed was in West Gangetic Moist Mixed Deciduous Forest and Northern Dry Mixed Deciduous Forests while density value of 110 ha^{-1} in Moist Shiwalik Sal Forest and Moist Terai Sal Forest were obtained. Highest adult trees density value recorded was 40 ha^{-1} in Northern Dry Mixed Deciduous Forest. Species is scantly distributed in the sub-tropical region and is ecologically very important for bird nesting and as feed. Hence, suitable measures are required for its conservation.

Regeneration Status and Population Structure

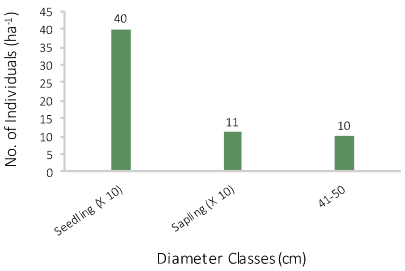
5B/C2 Northern Dry Mixed Deciduous Forest (n=40)



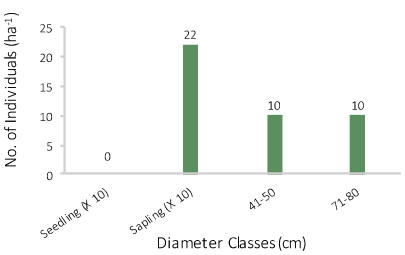
3C/C2c Moist Terai Sal Forest (n=30)



3C/C2a Moist Shiwalik Sal Forest (n=10)

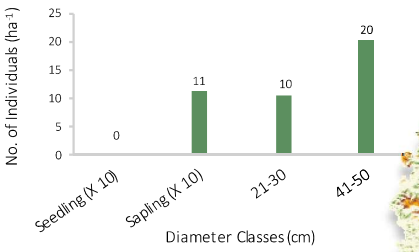


3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)

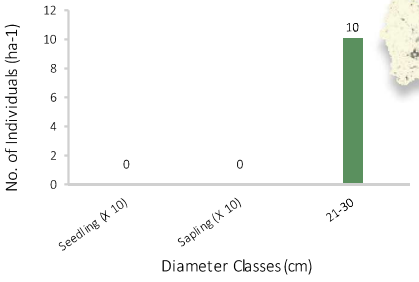


Regeneration Status and Population Structure

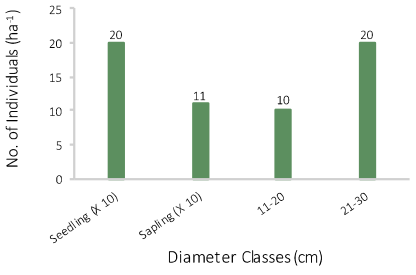
5B/C2 Northern Dry Mixed Deciduous Forest (n=30)



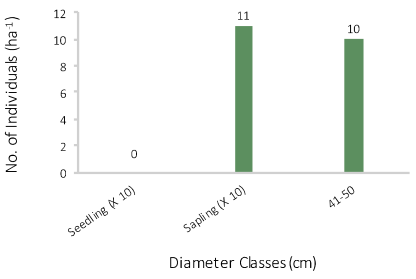
3C/C2a Moist Shiwalik Sal Forest (n=10)



5B/C1b Dry Plain Sal Forest(n=30)

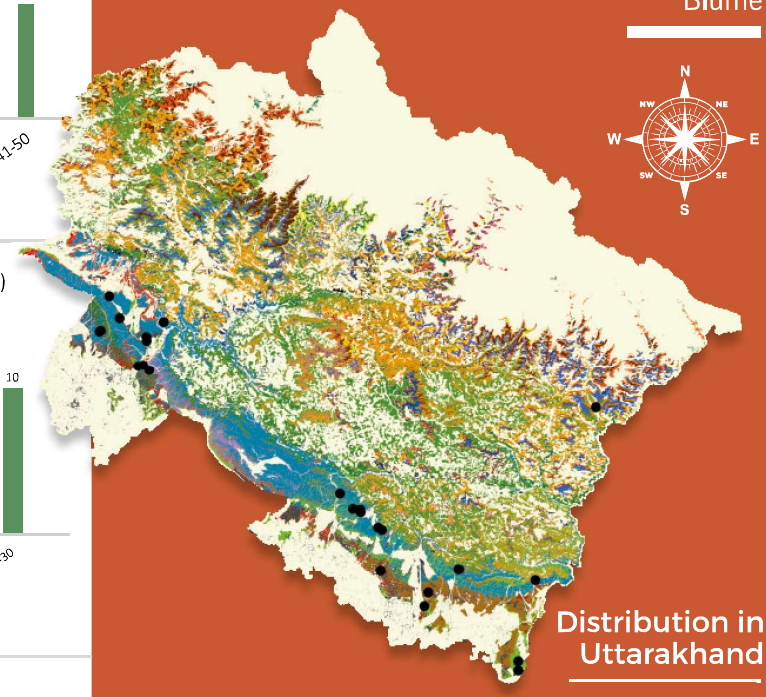


12/C1a Ban Oak Forest (n=10)



Ficus rumphii

Blume



Distribution in Uttarakhand

Species occurs throughout the area upto 1,200 m. Common in the Terai and Bhabar where it is associated with Sal.

Occurrence in Forest Types

3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 9/C1a, 9/C1b and 12/C1a.

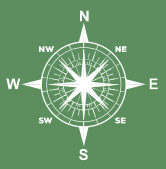
Forest Divisions

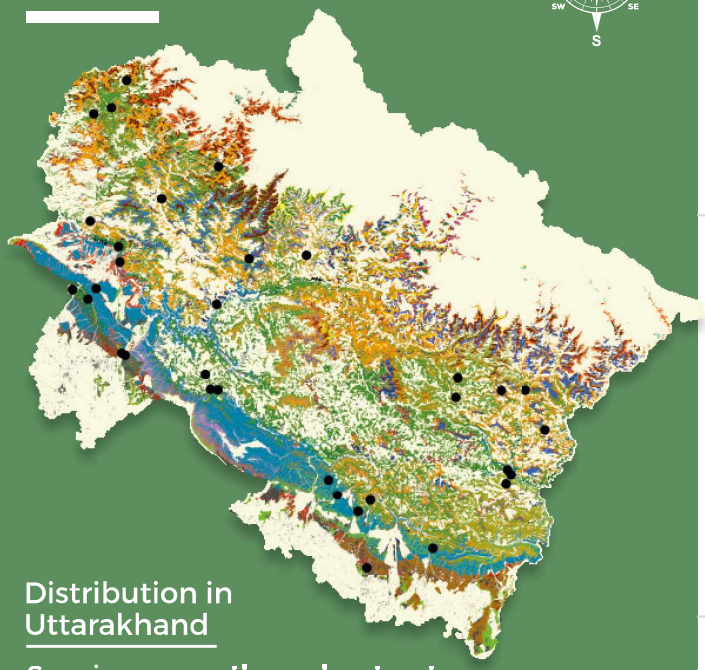
Dehra Dun, Mussoorie, Tons, Kalsi Soil Conservation, Haldwani, Champawat, Haridwar, Rajaji Tiger Reserve, Terai East, Ramnagar, Terai West, Terai Central and Pithoragarh.

The species exhibited 'poor' regeneration as no seedling stage was observed in Ban Oak Forest and Northern Dry Mixed Deciduous Forest, however 'good' regeneration was observed in Dry Plain Sal Forest. 'No' regeneration in Moist Shiwalik Sal Forest was observed. Seedlings were recorded only in Dry Plain Sal Forest with density value recorded was 200 ha^{-1}. Sapling density value estimated was 110 ha^{-1} in Ban Oak Forest, Dry Plain Sal Forest and Northern Dry Mixed Deciduous Forest while in Moist Shiwalik Sal Forest, it was altogether absent. Highest adult trees density value estimated was of 30 ha^{-1} in Northern Dry Mixed Deciduous Forest. Species had scanty distribution in the sub-tropical region. This is ecologically important species for bird nesting and as feed, hence, suitable measures are required for its conservation.

Ficus semicordata

Buch.-Ham. ex J. E. Sm.





Distribution in Uttarakhand

Species occurs throughout upto 1,500 m. Common on the banks of streams and on steep rocky ground.

Occurrence in Forest Types

3C/C2a, 3C/C2c, 3C/C2d, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2, 9/C1a, 9/C1b, 12/C1a, 12/C2c and 12/1S1.

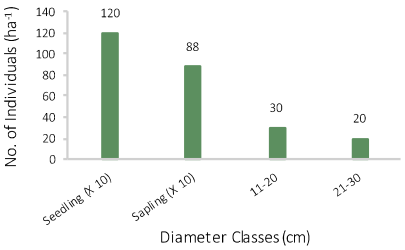
Forest Divisions

Champawat, Ramnagar, Chakrata, Haldwani, Terai Central, Terai East, Terai West, Uttarkashi, Bageshwar, Pithoragarh, Nainital, Mussoorie, Tons, Kalsi Soil Conservation, Almora, Alaknanda Civil Soyam, Upper Yamuna, Narendranagar, Rudraprayag, Tehri Dam-I, Pauri, Dehra Dun and Lansdowne.

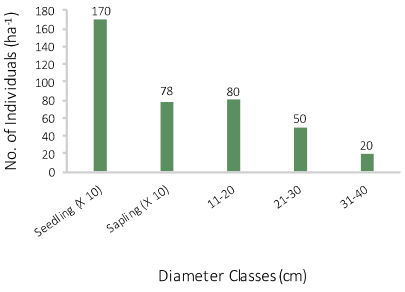
Overall regeneration status of the species exhibited was 'good' except in Ban Oak Forest where 'fair' regeneration was observed. Highest seedlings density value of 1,700 ha^{-1} was observed in Moist Terai Sal Forest while lowest value of 300 ha^{-1} was in Ban Oak Forest. However, highest sapling density value observed was 880 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest indicating better establishment of seedlings to saplings. Absence of sapling stage signifies disturbances in the areas. Highest adult trees density value recorded was 150 ha^{-1} in Moist Terai Sal Forest. The species is ecologically important for bird nesting and also as feed, however, its distribution was sparse. Hence, appropriate strategies are required to be developed for its conservation.

Regeneration Status and Population Structure

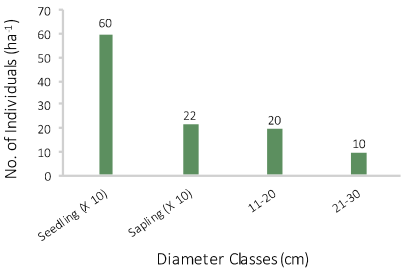
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=50)



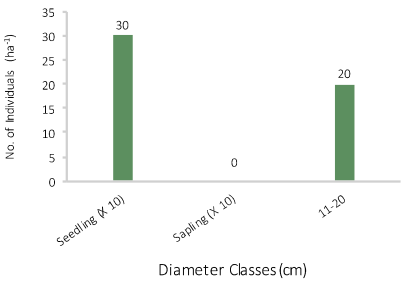
3C/C2c Moist Terai Sal Forest(n=150)



5B/C1a Dry Shiwalik Sal Forest (n=30)



12/C1a Ban Oak Forest (n=20)

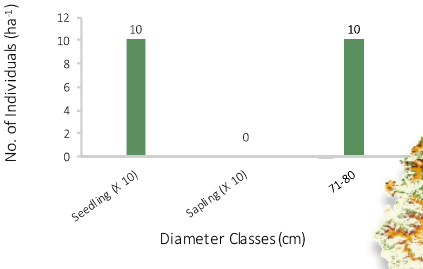


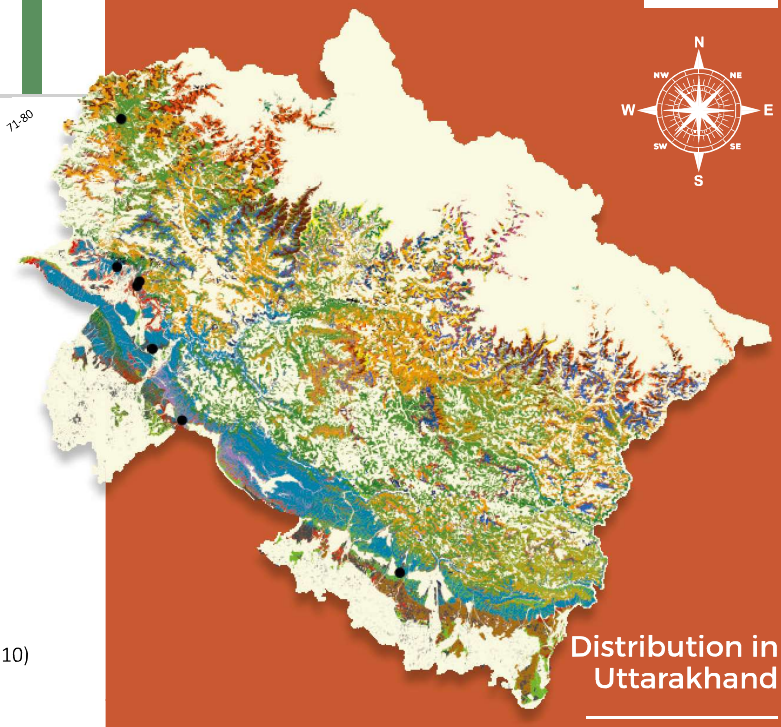
Ficus virens

Aiton

Regeneration Status and Population Structure

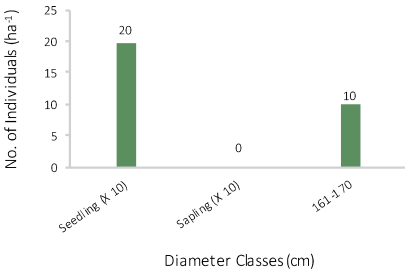
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=10)



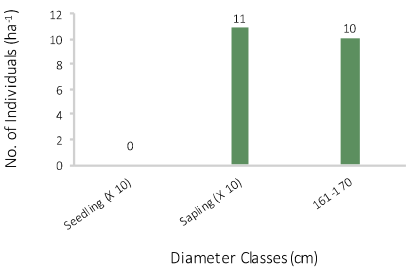


Distribution in Uttarakhand

3C/C2a Moist Shiwalik Sal Forest (n=10)



5B/C1a Dry Shiwalik Sal Forest (n=10)



Species found throughout between 300-800 m.

Occurrence in Forest Types
3C/C2a, 3C/C3a and 5B/C1a

Forest Divisions
Ramnagar, Mussoorie, Dehra Dun, Tons, Lansdowne and Rajaji Tiger Reserve.

The species exhibited 'fair' regeneration in West Gangetic Moist Mixed Deciduous Forest and Moist Shiwalik Sal Forest while 'poor' regeneration in Dry Shiwalik Sal Forest as no seedling was recorded. Seedling densities values observed were 200 ha^{-1} and 100 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest and Moist Shiwalik Sal Forest, respectively. Sapling density value observed was 110 ha^{-1} in Shiwalik Sal Forest. Adult trees density of 10 ha^{-1} was recorded in all assessed forest types. This is an ecologically important species for bird nesting and also feed. Population size was meagre, hence, suitable strategies are required for its conservations.

Conservation of Forest Genetic Resources

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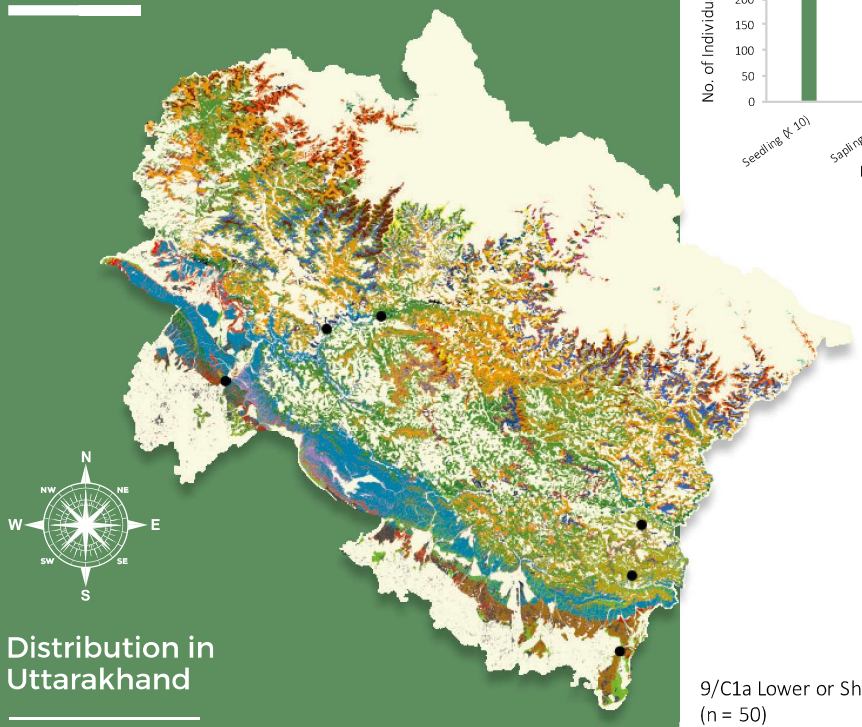
Uttarakhand State

Flacourtia jangomas

(Lour.) Raeusch.



Distribution in Uttarakhand

Species occurs in Sal forests upto 1,000 m.

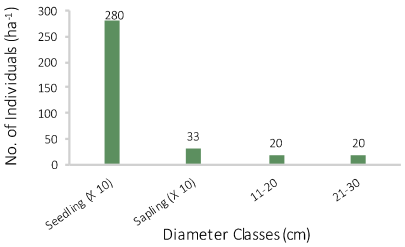
Occurrence in Forest Types
3C/C2a, 5B/C2, 9/C1a and 12/C2b

Forest Divisions
Dehra Dun, Kalsi Soil Conservation, Champawat, Terai East, Narendranagar and Rudraprayag.

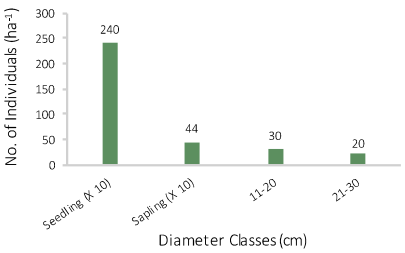
The species exhibited overall 'good' regeneration. Highest seedling density recorded was 2,800 ha^{-1} in Northern Dry Mixed Deciduous Forest while lowest values of 600 ha^{-1} was observed in Moist Shiwalik Sal Forest. However, highest sapling and adult tree density value recorded were 440 ha^{-1} and 50 ha^{-1} in Lower or Shiwalik Chir Pine Forest, respectively indicating better establishment into saplings and then to adult trees. Species is ecologically important as a source of food for wild animals. However, population was low and is scatteredly distributed. Hence, appropriate strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

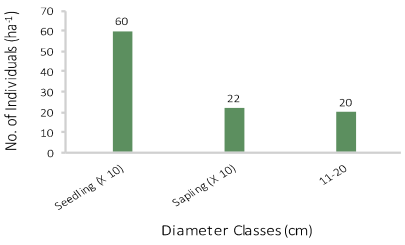
5B/C2 Northern Dry Mixed Deciduous Forest (n=40)



9/C1a Lower or Shiwalik Chir Pine Forest (n = 50)



3C/C2a Moist Shiwalik Sal Forest (n=20)

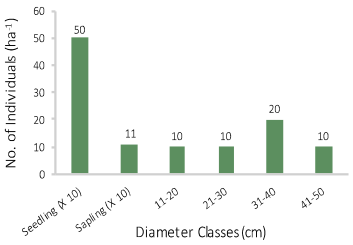


Fraxinus micrantha

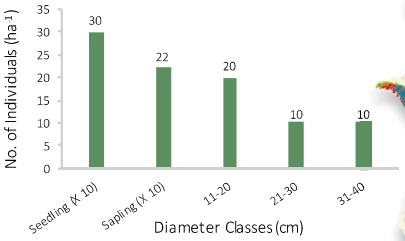
Lingelsh.

Regeneration Status and Population Structure

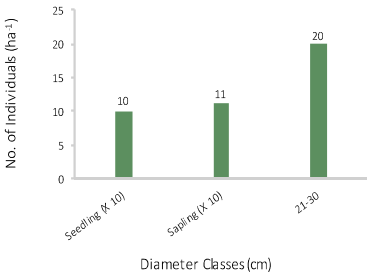
12/C1a Ban Oak Forest (n= 50)



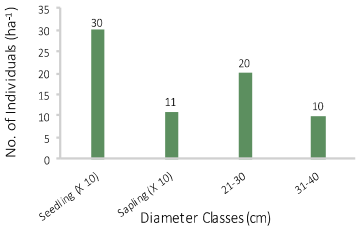
9/C1b Upper or Himalayan Chir Pine Forest (n=40)



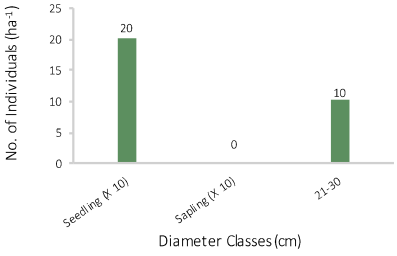
12/1S1 Alder Forest (n=20)



12/C2b West Himalayan Upper Oak/Fir Forest (n=30)



12/C1c Moist Deodar Forest (n=10)



Distribution in Uttarakhand

Species occurs throughout the hills between 2,000 – 2,500 m. usually in oak Forests.

Occurrence in Forest Types

3C/C3a, 9/C1b, 12/C1a, 12/C1b, 12/C1c, 12/C2b, 12/1S1 and 14/C1b.

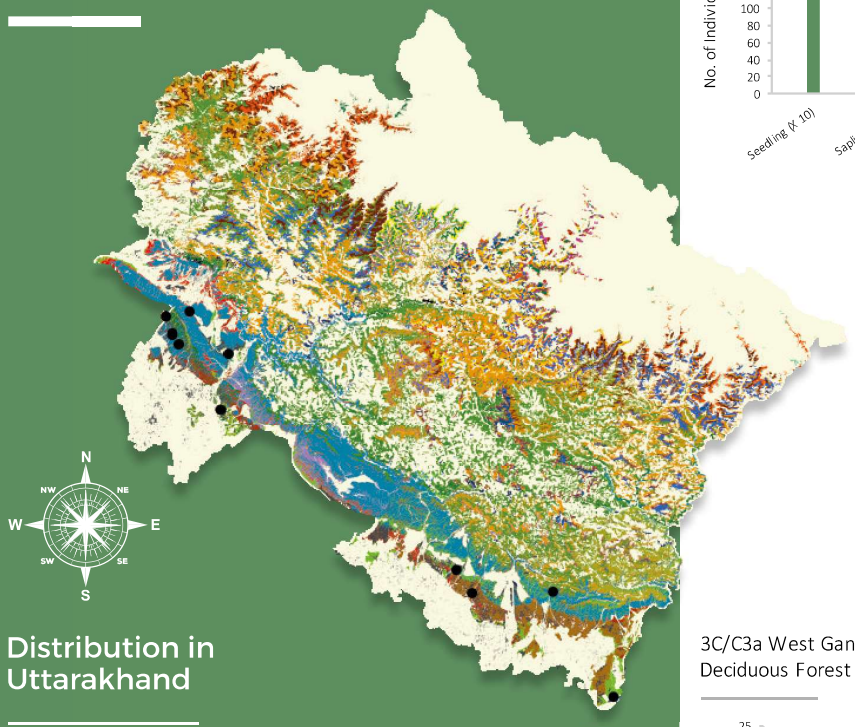
Forest Divisions

Bageshwar, Nainital, Pithoragarh, Pauri, Almora, Uttarkashi and Benog Wildlife Sanctuary.

Overall 'good' regeneration of species was exhibited, except 'fair' regeneration was observed in Alder Forest and Moist Deodar Forest. However, proportion of seedlings, saplings and adult trees showed notable variations. Highest seedling density value recorded was 500 ha^{-1} in Ban Oak Forest while lowest of 100 ha^{-1} in Alder Forest. Highest sapling density of 220 ha^{-1} was observed in Upper or Himalayan Chir Pine Forest while Moist Deodar Forest was devoid of sapling stage. Highest adult tree density value of 50 ha^{-1} was observed in Ban Oak Forest and lowest value of 10 ha^{-1} was in Moist Deodar Forest. Species has scanty distribution hence, suitable strategies are required for its conservation and improvement.

Garuga pinnata

Roxb.



Distribution in Uttarakhand

Species occurs throughout up to 1,500 m.

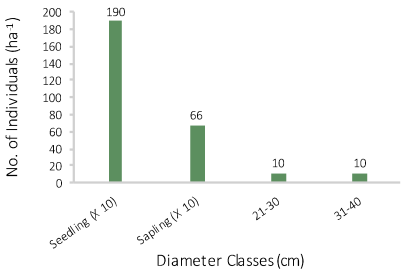
Occurrence in Forest Types
3C/C2a, 3C/C3a, 3C/C2c, 5B/C1a, 5B/C1b, 9/C1b and 12/C1a.

Forest Divisions
Ramnagar, Terai East, Upper Yamuna, Terai Central, Haldwani, Dehra Dun and Rajaji Tiger Reserve

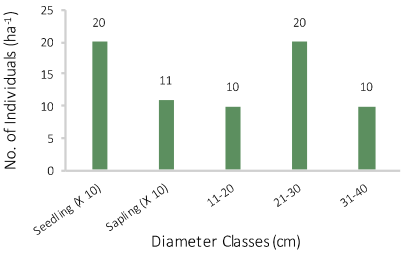
Species depicted overall 'good' regeneration. Highest seedlings and saplings densities values recorded were 1,900 ha^{-1} and 660 ha^{-1}, respectively in Ban Oak Forest. However, their recruitment to adult tree stage was only 20 ha^{-1}. Highest adult tree density of as 40 ha^{-1} was observed in West Gangetic Moist Mixed Deciduous Forest. The species is scatteredly distributed in its natural distribution range, hence, suitable strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

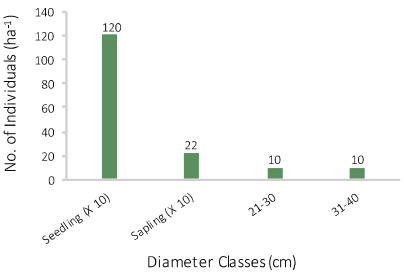
12/C1a Ban Oak Forest (n=20)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=40)



3C/C2a Moist Shiwalik Sal Forest (n=20)



Conservation of Forest Genetic Resources

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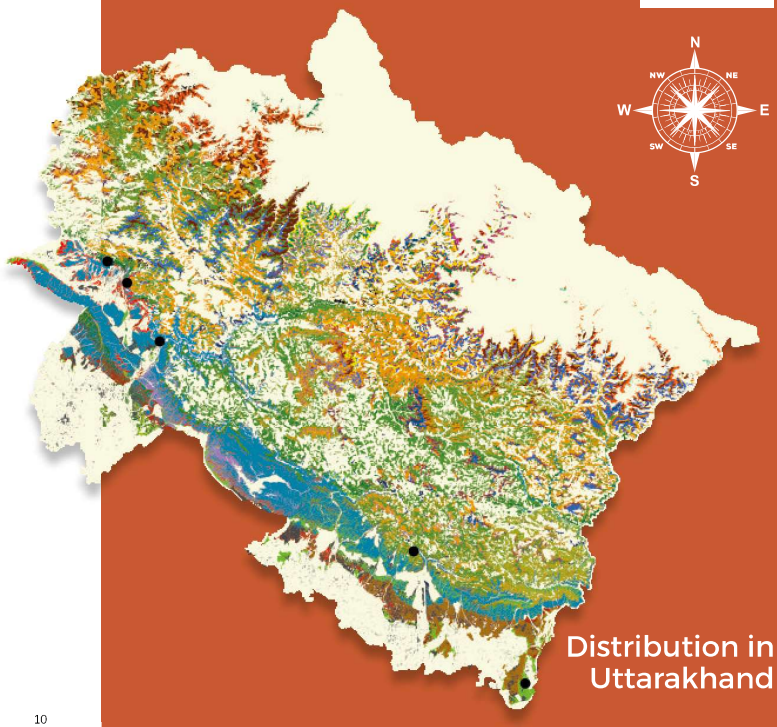
Uttarakhand State

Gmelina arborea

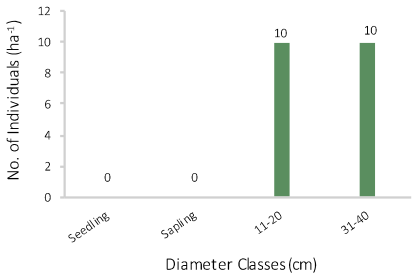
Roxb. ex Sm.



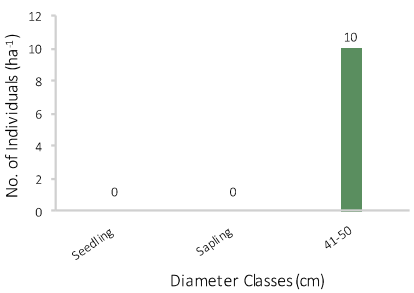
Distribution in Uttarakhand

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=20)



3C/C2a Moist Shiwalik Sal Forest (n=10)



Species occurs up to 900 m.

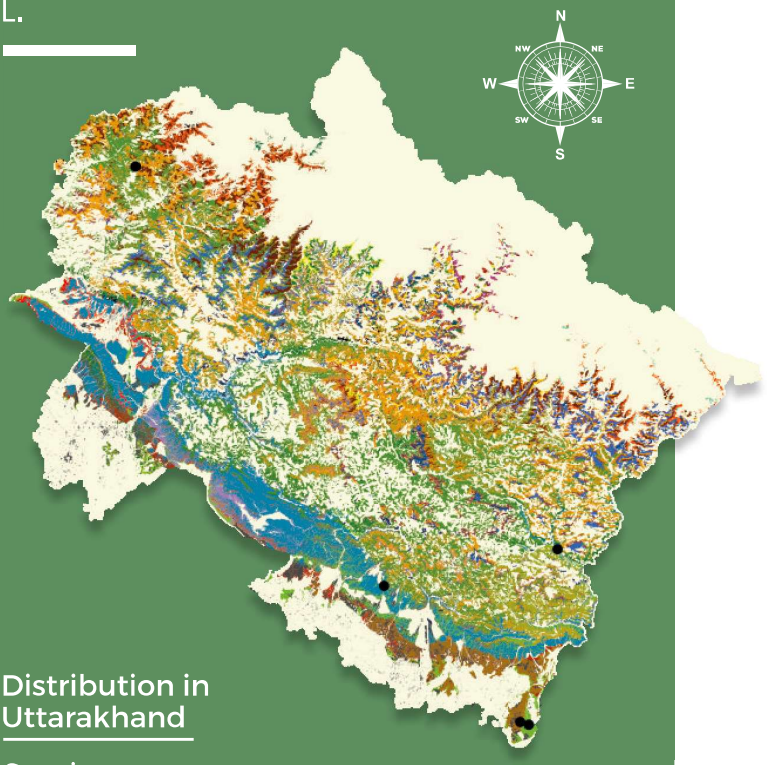
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a and 9/DS2.

Forest Divisions
Nainital, Terai East, Mussoorie and Narendranagar

Species exhibited 'no' regeneration as only adult tree population was observed. Adult tree density observed was 20 ha^{-1} in Moist Terai Sal Forest and 10 ha^{-1} in Moist Shiwalik Sal Forest. Species is observed only in adult tree stage. Moreover, adult population was also very low. Therefore, suitable strategies are required to be developed for its conservation and improvement.

Grewia asiatica

L.



Distribution in Uttarakhand

Species occurs up to 900 m.

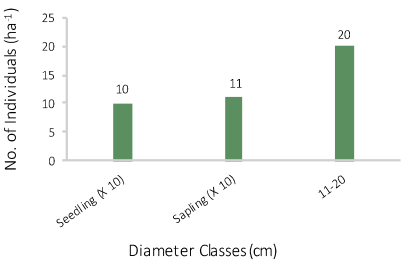
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C2 and 9/C1b.

Forest Divisions
Champawat, Terai East, Ramnagar and Upper Yamuna.

The species exhibited 'fair' regeneration in its natural distribution range. Densities of seedling, sapling and adult trees recorded were 100 ha^{-1}, 110 ha^{-1} and 20 ha^{-1}, respectively. The species has escaped from cultivation areas and naturalized in the forest areas. Population was meagre and scatteredly distributed. Hence, suitable management strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=20)

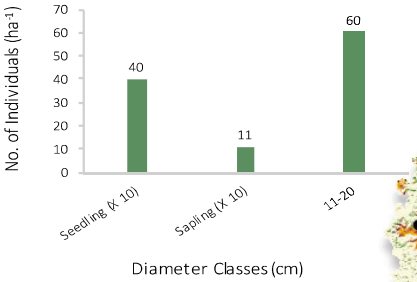


Grewia optiva

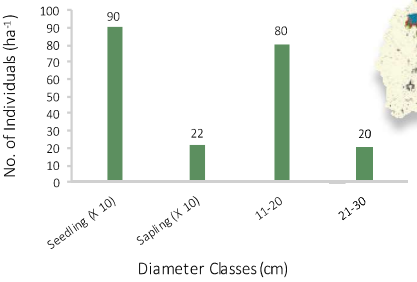
J. R. Drumm. ex Burret

Regeneration Status and Population Structure

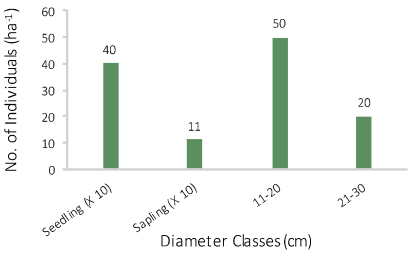
12/C2a Kharsu Oak Forest (n=60)



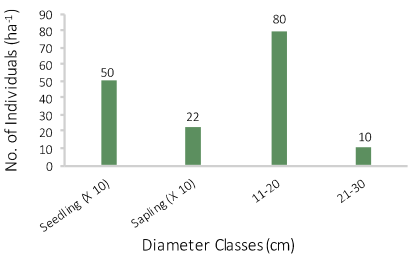
12/C1a Ban Oak Forest (n=100)

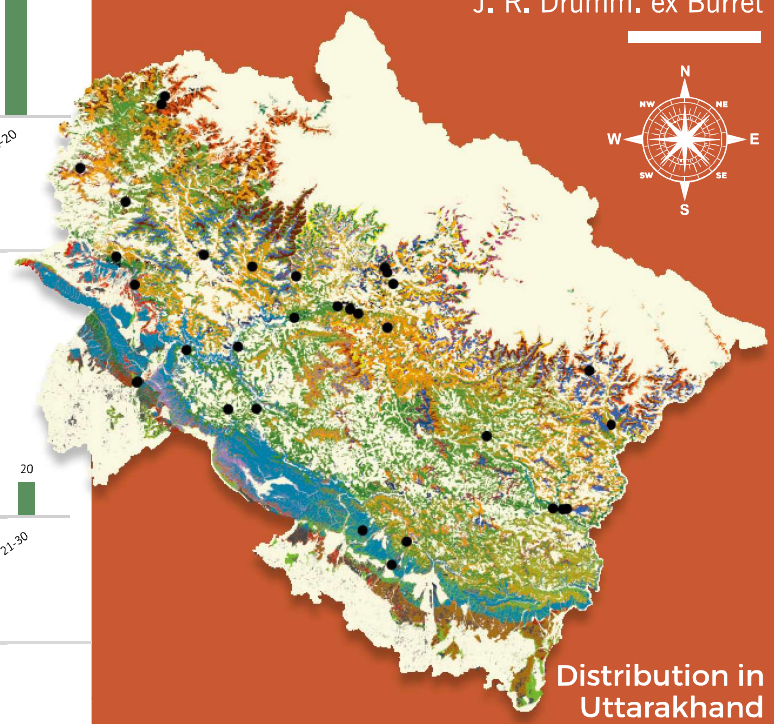


5B/C2 Northern Dry Mixed Deciduous Forest (n=70)



9/C1b Upper or Himalayan Chir Pine Forest (n=90)





Distribution in Uttarakhand

Species occurs up to 2,000 m.

Occurrence in Forest Types

3C/C2a, 3C/C3a, 5B/C1a, 5B/C2, 5/1S2, 9/C1a, 9/C1b, 12/C1a, 12/C1b, 12/C1c, 12/C1e, 12/C2a and 12/C2c.

Forest Divisions

Champawat, Dehra Dun, Kalsi Soil Conservation, Tons, Chakrata, Pithoragarh, Bageshwar, Uttarkashi, Gobind Pashu Bihar, Ramnagar, Nainital, Almora, Rudraprayag, Badrinath, Alkananda Soil Conservation, Mussoorie, Lansdowne, Tehri, Tehri Dam -I, Pauri and Kedarnath Wildlife Sanctuary.

The species showed overall 'good' regeneration in its natural distribution range. Highest value of seedling density observed was 900 ha^{-1} in Ban Oak Forest while lowest of 400 ha^{-1} in Northern Dry Mixed Deciduous Forest and Kharsu Oak Forest. Sapling density observed was 220 ha^{-1} in Upper or Himalayan Chir Pine Forest and Ban Oak Forest while it was 110 ha^{-1} in Northern Dry Mixed Deciduous Forest and Kharsu Oak Forest. Highest adult trees density recorded was 100 ha^{-1} in Ban Oak Forest and lowest value recorded was 60 ha^{-1} in Kharsu Oak Forest. Species is very important for its fodder value. However, its adult population is scanty, hence, suitable management strategies are required for its conservation and improvement.

Conservation of Forest Genetic Resources

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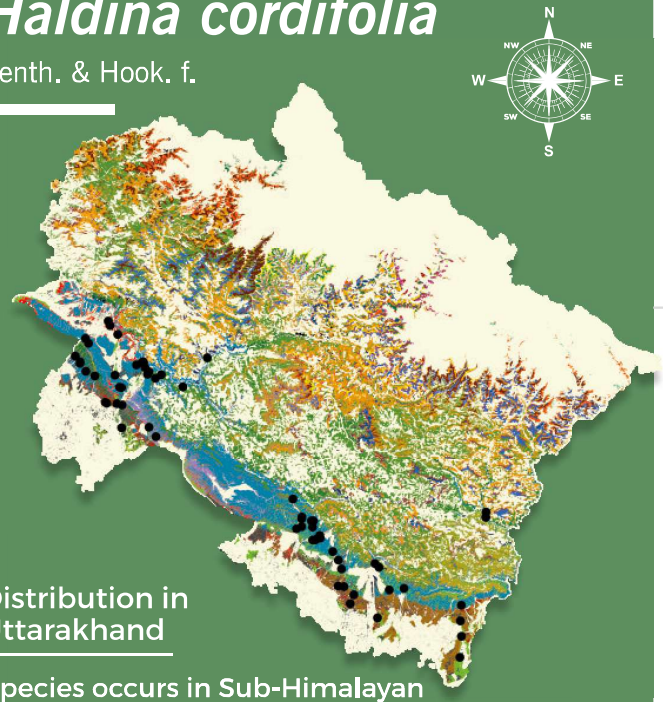
Uttarakhand State

Haldina cordifolia

Benth. & Hook. f.



Distribution in Uttarakhand

Species occurs in Sub-Himalayan tract and valleys in the Outer or Shiwalik ranges up to 1,000 m.

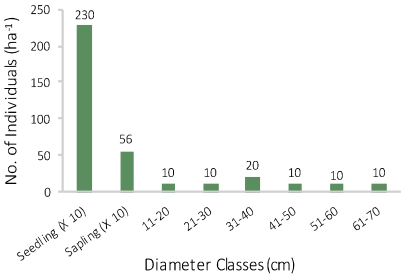
Occurrence in Forest Types
3C/C2a, 3C/C2c 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2, 5/DS1 and 9/C1a.

Forest Divisions
Champawat, Lansdowne, Terai Central, Haldwani, Ramnagar, Dehra Dun, Narendranagar, East Terai, Corbett National Park, Pithoragarh, Mussoorie, Kalsi Soil Conservation Forest Division and Rajaji Tiger Reserve.

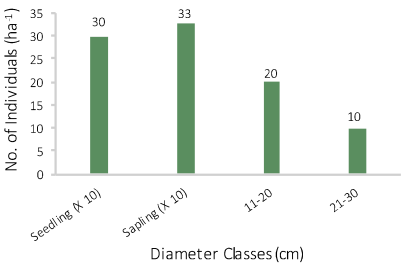
Overall regeneration of species was 'good' except 'fair' regeneration was observed in Northern Dry Mixed Deciduous Forest. Highest seedling density of 2,300 ha^{-1} was observed in Moist Shiwalik Sal Forest and lowest density of 300 ha^{-1} was in Northern Dry Mixed Deciduous Forest. Highest sapling density of 550 ha^{-1} was also recorded in Moist Shiwalik Sal Forest, however, lowest value observed was 110 ha^{-1} in Dry Deciduous Scrub. In Northern Dry Mixed Deciduous Forest, densities of seedlings and saplings were almost same, revealed disturbance in the area. Highest adult trees density recorded was 160 ha^{-1} in Western Gangetic Moist Mixed Deciduous Forest and lowest of 30 ha-1 in Northern Dry Mixed Deciduous Forest. Higher adult diameter classes upto 51 cm - 60 cm and 61 cm -70 cm were observed in most forest types, however, in Northern Dry Mixed Deciduous Forest density classes only upto 21 cm -30 cm were recorded. Hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

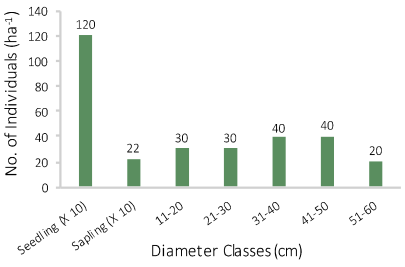
3C/C2a Moist Shiwalik Sal Forest (n=70)



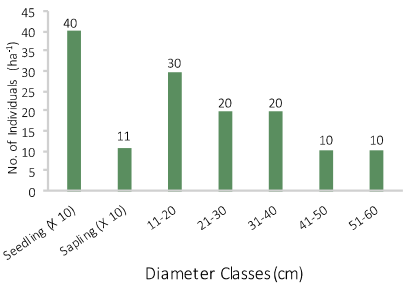
5B/C2 Northern Dry Mixed Deciduous Forest (n=30)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=160)



5/DS1 Dry Deciduous Scrub (n=90)



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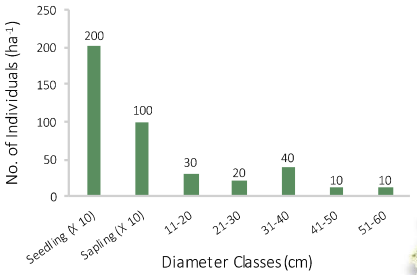
Holoptelea integrifolia

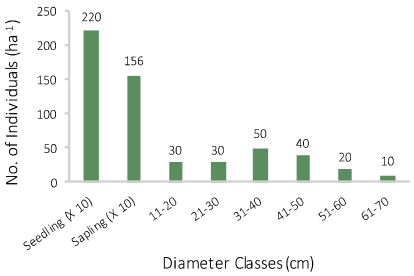
(Roxb.) Planch.

Regeneration Status and Population Structure

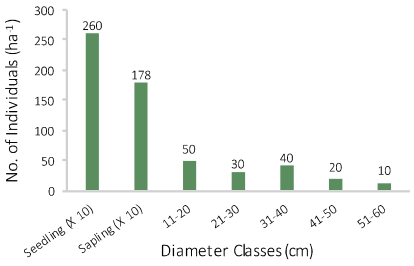
3C/C2a Moist Shiwalik Sal Forest (n=110)

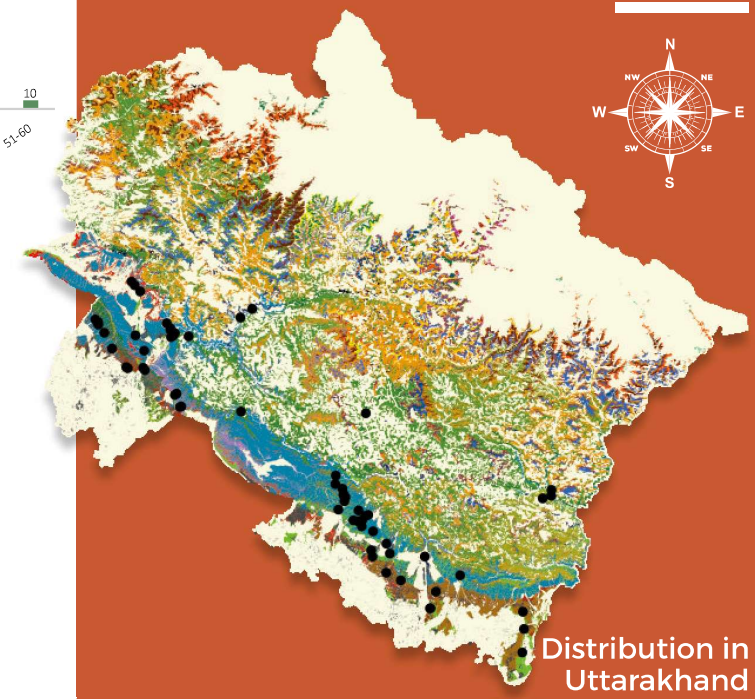


3C/C2c Moist Terai Sal Forest (n=180)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=150)





Distribution in Uttarakhand

Species occurs along the Sub Himalayan tract and Outer or Shiwalik Ranges up to 800 m.

Occurrence in Forest Types

3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/DS1, 9/C1a and 12/C2b.

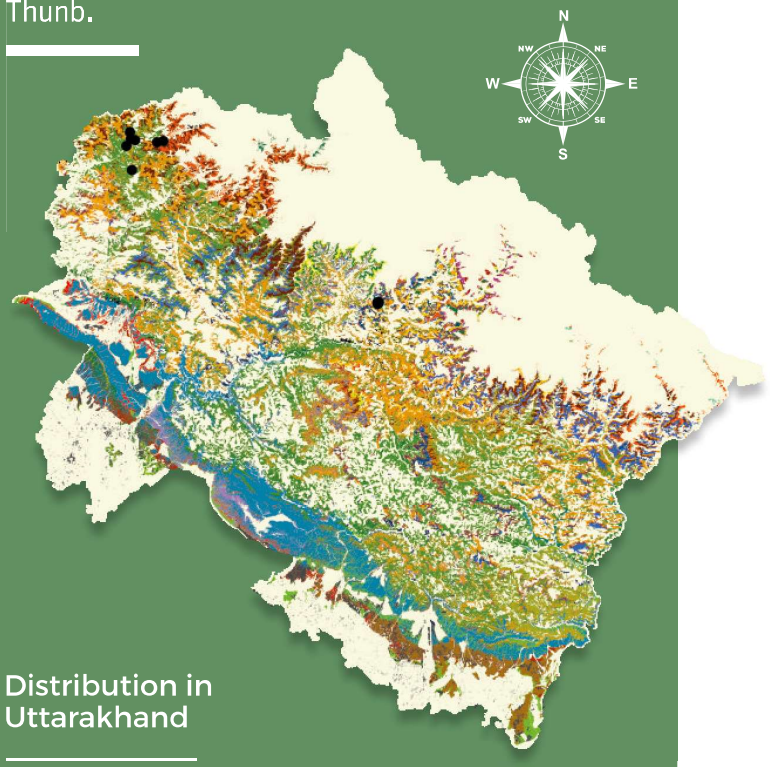
Forest Divisions

Champawat, Terai East, Terai Central, Pithoragarh, Ramnagar, Terai West, Narendranagar, Mussoorie, Dehra Dun, Lansdowne and Haldwani

The species exhibited overall 'good' regeneration in its natural range. Highest seedling density observed was 2,600 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest, followed by 2,200 ha^{-1} in Moist Terai Sal Forest and 2,000 ha^{-1} in Moist Shiwalik Sal Forest. Similar trend was observed in case of saplings. However, highest adult tree density value of 180 ha^{-1} was in Moist Terai Sal Forest, followed by 150 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest, and 110 ha^{-1} in Moist Shiwalik Sal Forest. Overall population and regeneration of species was good, however, suitable strategies are required for its future conservation and improvement programme.

Hovenia dulcis

Thunb.



Distribution in Uttarakhand

Species occurs up to central and inner hill ranges between 900-1,800 m.

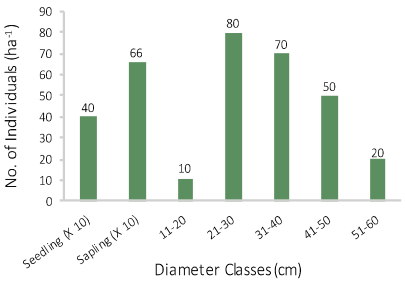
Occurrence in Forest Types
9/C1b,12/C1a, 12/C1c, and 12/C2b

Forest Divisions
Tons and Govind Pashu Vihar National Park.

The species exhibited 'fair' regeneration in its natural range. Values of seedling and sapling densities estimated were 400 ha^{-1} and 660 ha^{-1} respectively, in Ban Oak Forest. Total adult trees density observed was 230 ha^{-1}. Maximum diameter class of 51-60 cm was recorded. Species was reported only from Govind Pashu Vihar NP. Hence, further extensive studies are required to trace its distribution and formulate suitable conservation strategies for its conservation.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=230)

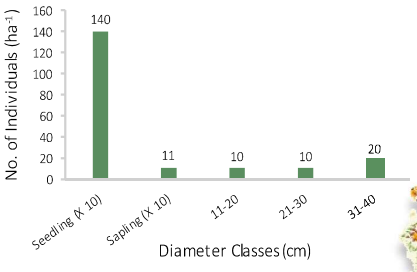


Hymenodictyon orixense

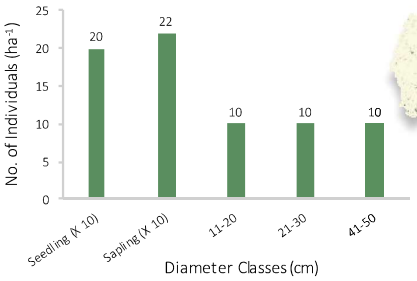
Roxb. (Mabb.)

Regeneration Status and Population Structure

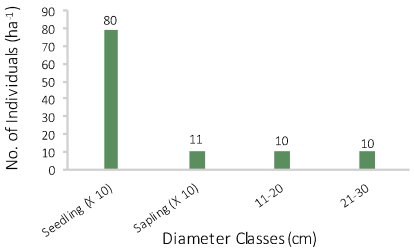
3C/C2a Moist Shiwalik Sal Forest (n=40)



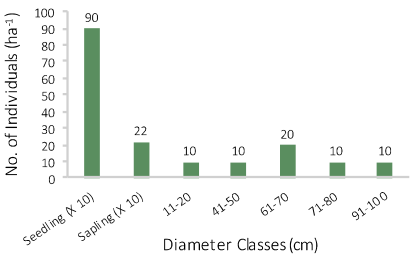
3C/C2c Moist Terai Sal Forest (n=30)

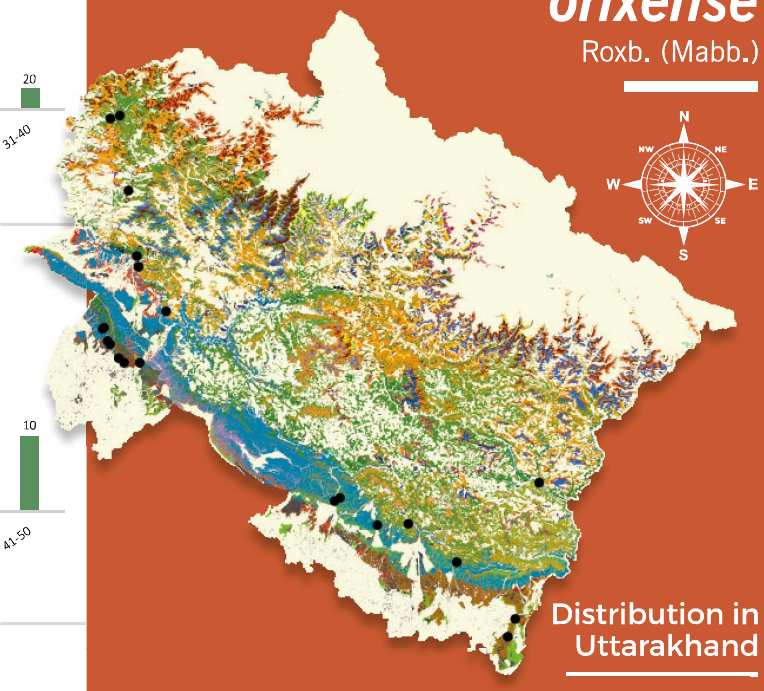


3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)



5B/C2 Northern Dry Mixed Deciduous Forest (n=60)





Distribution in Uttarakhand

Species occurs in dry and moist places from 300-1,400 m.

Occurrence in Forest Types

3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b, 5/1S2 and 9/C1b.

Forest Divisions

Champawat, Terai East, Haldwani, Ramnagar, Nainital, Mussoorie, Tons, Tehri Garhwal, Chakrata, Haridwar and Uttarkashi and Rajaji Tiger Reserve.

The species exhibited overall 'good' regeneration, except in Moist Terai Sal Forest where in 'fair' regeneration was observed. However, proportion of different stages showed variation. Highest seedling density observed was 1,400 ha^{-1} in Moist Shiwalik Sal Forest while lowest value observed was 200 ha^{-1} in Moist Terai Sal Forest. Sapling density value of 220 ha^{-1} was observed in Moist Terai Sal Forest, and Northern Dry Mixed Deciduous Forest while its lowest value observed was 110 ha^{-1} in Moist Shiwalik Sal Forest and West Gangetic Moist Mixed Deciduous Forest. Highest adult trees density value obtained was 60 ha^{-1} in Northern Dry Mixed Deciduous Forest. Adult individuals up to 91-100 cm diameter class were observed. Species is scantly distributed in its natural range, hence, suitable strategies are required to be developed for its conservation.

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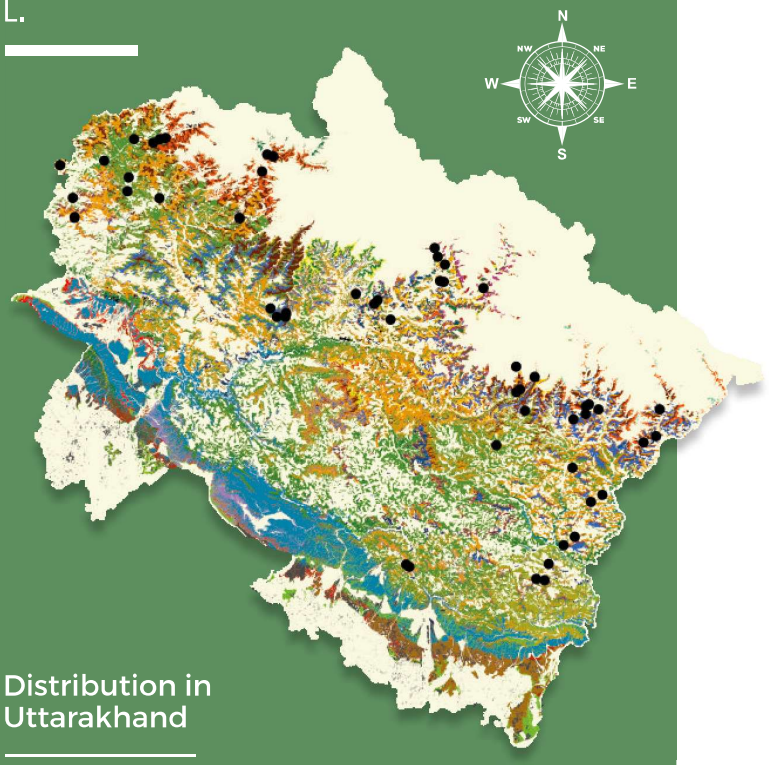
Uttarakhand State

Juglans regia

L.



Distribution in Uttarakhand

Species occurs up to 1,200-3,000 m on the inner ranges in mixed deciduous forests.

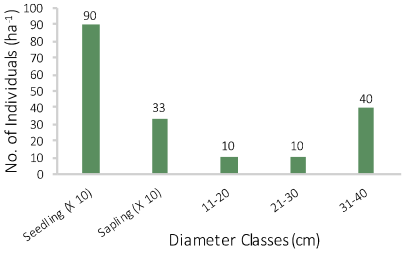
Occurrence in Forest Types
9/C1b, 9/DS1, 9/DS2, 12/C1a, 12/C1b, 12/C1c, 12/C1e, 12/C1f, 12/C2b and 14/C1b.

Forest Divisions
Chakrata, Champawat, Pithoragarh, Uttarkashi, Bageshwar, Kedarnath, Tons, Tehri, Nainital and Govind Pashu Vihar National Park.

The species was depicted 'good' regeneration. Seedling and sapling densities observed were 900 ha^{-1} and 330 ha^{-1}, respectively. Adult tree density recorded was 60 ha^{-1}. High density value of 40 ha^{-1} was observed in upper diameter class of 31-40 cm. This species is economically important and was sparsely distributed in its natural range. Hence, wild gene pool of the species is required to be conserved for future improvement programme.

Regeneration Status and Population Structure

14/C1b West Himalayan Sub-Alpine Birch Fir Forest (n=60)



Conservation of Forest Genetic Resources

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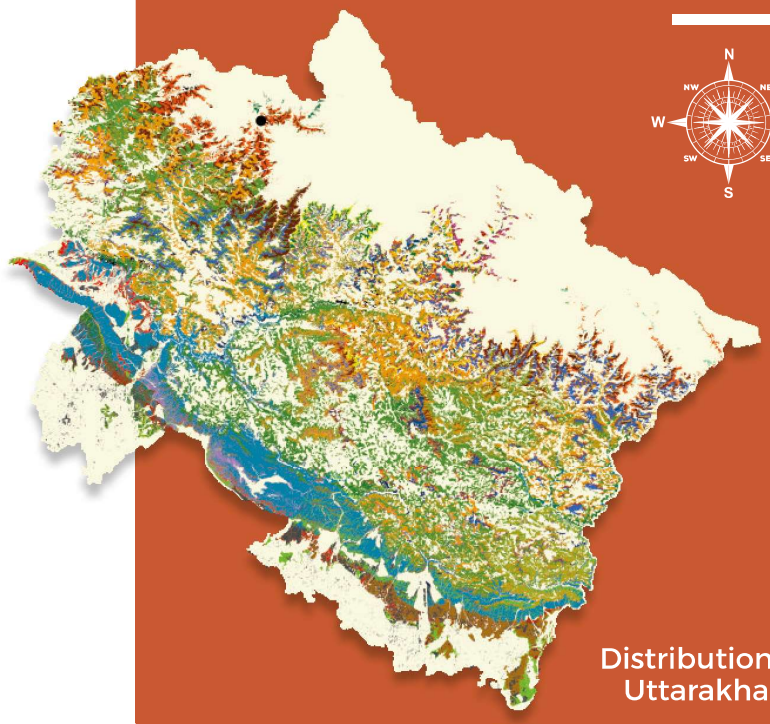
Uttarakhand State

Juniperus polycarpos

C. Koch



Distribution in Uttarakhand

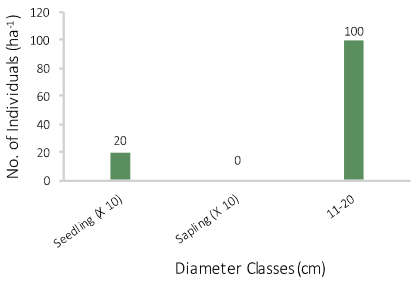
Species occurs between 2,500-3,600 m.

Occurrence in Forest Types
14/C1b and 16/E1

Forest Divisions
Uttarkashi and Gangotri National Park.

Regeneration Status and Population Structure

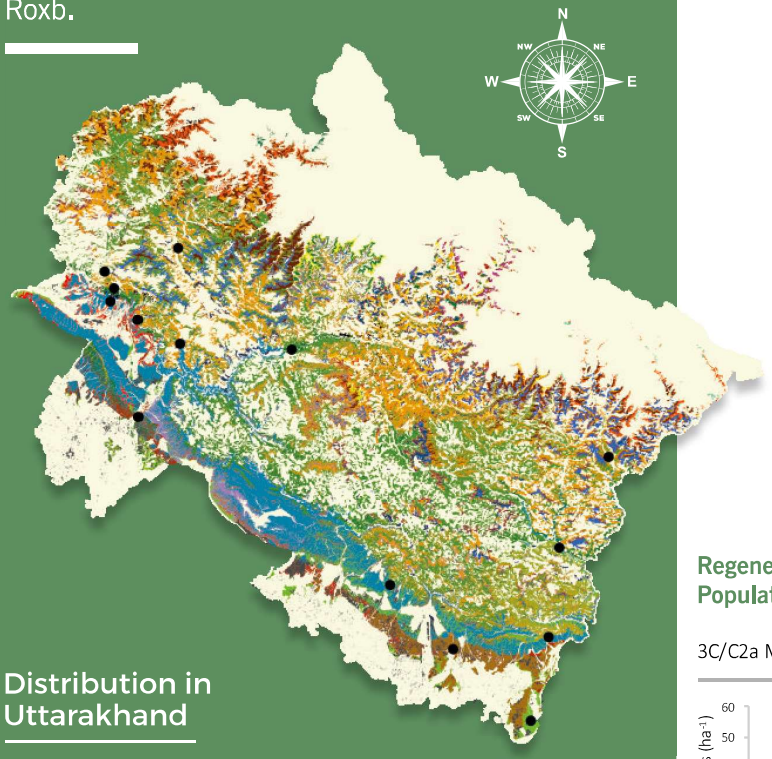
16/E1 Dwarf Juniper Scrub (n=100)



The species exhibited 'fair' regeneration as densities of seedlings > saplings < adult trees. Seedling density value of 200 ha^{-1} was recorded whereas sapling stage was altogether absent indicating disturbances in the area. Adult tree density value of 100 ha^{-1} was recorded from lower diameter class of 11–20 cm. Population was scanty, hence, suitable management strategies are required to be adopted for its conservation.

Kydia calycina

Roxb.



Distribution in Uttarakhand

Species occurs up to 1,300 m in the valleys of hills at low elevations.

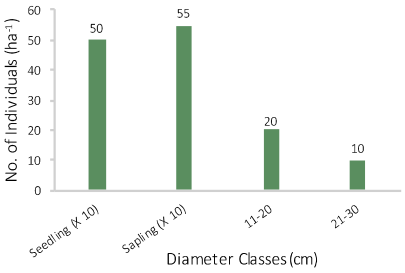
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C2d, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2, 9/C1a and 12/C1a.

Forest Divisions
Terai East, Dehra Dun, Haridwar, Mussoorie, Chakrata, Ramnagar, Lansdowne, Kalsi, Terai Central, Haldwani, Narendranagar and Tehri.

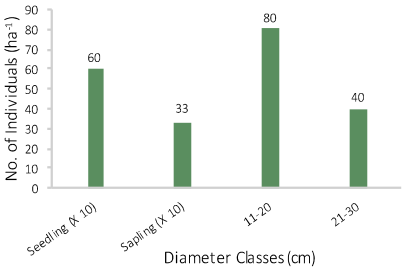
Overall regeneration status of the species in its natural distribution range in Dry Plain Sal Forest was 'good' while 'fair' regeneration was recorded in Moist Shiwalik Sal Forest. However, proportion of different regeneration stages showed variation. Seedling density value of 600 ha^{-1} and 500 ha^{-1} were recorded in Dry Plain Sal Forest and Moist Shiwalik Sal Forest, respectively. Sapling density value of 330 ha^{-1} for Dry Plain Sal Forest was recorded while density value of 560 ha^{-1} was in Moist Shiwalik Sal Forest. Adult tree density values observed were 120 ha^{-1} and 30 ha^{-1} for Dry Plain Sal Forest and Moist Shiwalik Sal Forest, respectively. Adult tree population was of small size. Hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

3C/C2a Moist Shiwalik Sal Forest (n=30)



5B/C1b Dry Plain Sal Forest (n=120)



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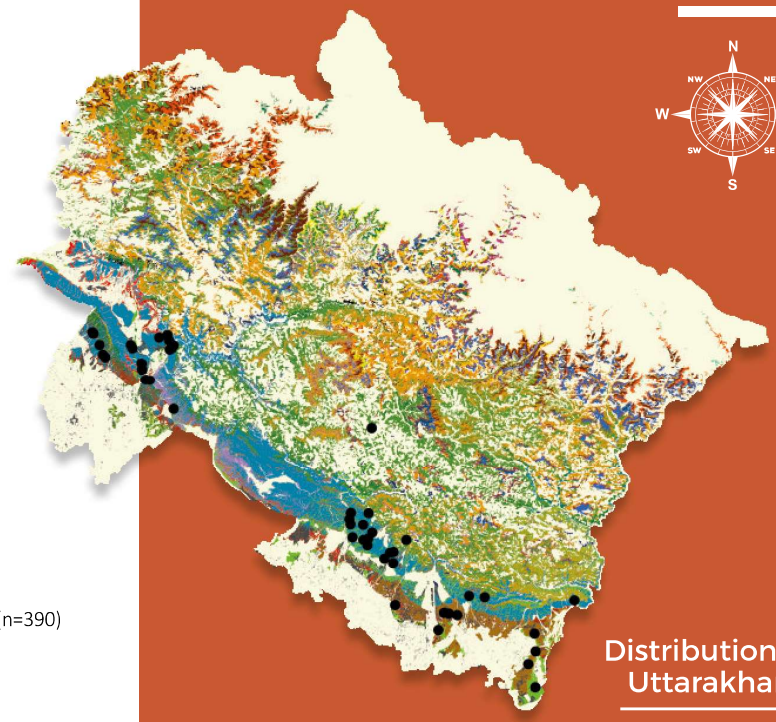
Lagerstroemia parviflora

Roxb.



Distribution in Uttarakhand

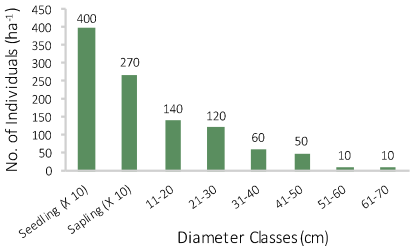
Species occurs between up to 900 m on the Outer or Shiwalik Ranges.

Occurrence in Forest Types
3C/C2c, 3C/C2a, 3C/C3a, 5/DS1, 5/1S2, 9/C1a and 9/DS1.

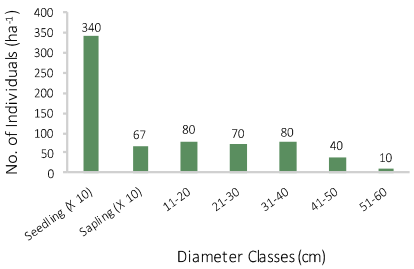
Forest Divisions
Dehra Dun, Kalsi Soil Conservation, Narendranagar, Ramnagar, Terai East, Terai West, Uttarkashi, Nainital, Tehri, Pithoragarh, Lansdowne, Haridwar, Mussoorie and Rajaji Tiger Reserve.

Regeneration Status and Population Structure

3C/C2a Moist Shiwalik Sal Forest (n=390)



3C/C2c Moist Terai Sal Forest (n=280)



Overall regeneration of species exhibited was 'good'. However, proportion of density values for seedlings, saplings and adult trees showed variation. Seedling density values reported were: 3,400 ha^{-1} and 4,000 ha^{-1} in Moist Terai Sal Forest, and Moist Shiwalik Sal Forest, respectively. Same trend was observed in case of saplings with high density value of 2700 ha^{-1} in Moist Shiwalik Sal Forest. Total adult tree density value of 390 ha^{-1} was observed in Moist Shiwalik Sal Forest while it was 280 ha^{-1} for Moist Terai Sal Forest. Higher density values were represented by lower diameter classes in both forest types. This species is very important, therefore, wild gene pool should be conserved. Suitable management strategies are also required to be developed for its conservation and improvement.

Lannea coromandelica

(Houtt.) Merill

Distribution in Uttarakhand

Species occurs in lowland and hill forests at elevations of 100-2,000 m.

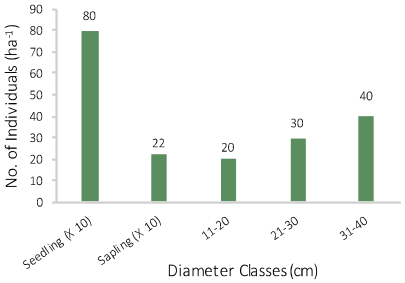
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/DS1, 5/1S2, 9/C1a, 9/C1b, 9/DS1, 12/C1a, and 12/C1d.

Forest Divisions
Champawat, Mussoorie, Terai East, Pithoragarh, Ramnagar, Nainital, Uttarkashi, Chakrata, Tons, Rudraprayag, Badrinath, Narendranagar, Tehri Dam-I, Dehra Dun, Lansdowne, and Haridwar and Rajaji Tiger Reserve.

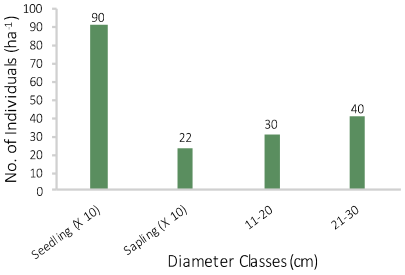
Overall regeneration status of the species was 'good'. Highest density values of seedling and saplings were: 3,000 ha^{-1} and 1900 ha^{-1}, respectively in Northern Dry Mixed Deciduous Forest. Highest adult tree density value recorded was 320 ha^{-1} in Northern Dry Mixed Deciduous Forests. Major contributions in adult population was from the lower diameter classes i.e., 11-20 cm and 21-30 cm. Wild gene should be conserved for future, also suitable strategies are require to be developed for its conservation and improvement.

Regeneration Status and Population Structure

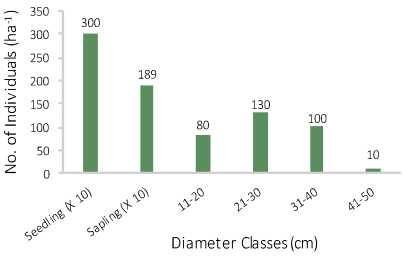
3C/C2c Moist Terai Sal Forest (n=90)



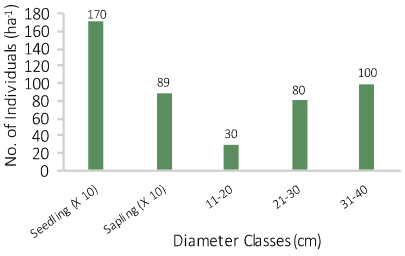
3C/C2a Moist Shiwalik Sal Forest (n=70)



5B/C2 Northern Dry Mixed Deciduous Forest (n=320)



9/C1b Upper or Himalayan Chir Pine Forest (n=210)



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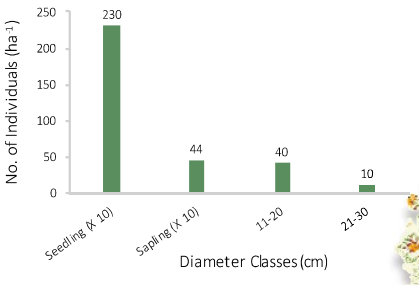
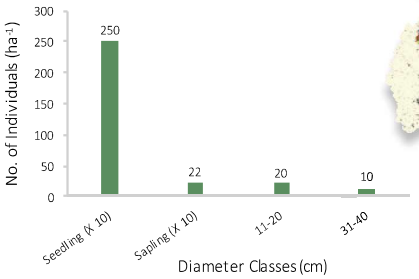
Litsea glutinosa (Lour.)

Regeneration Status and Population Structure

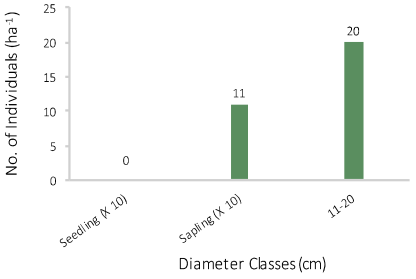
3C/C2c Moist Terai Sal Forest (n=50)



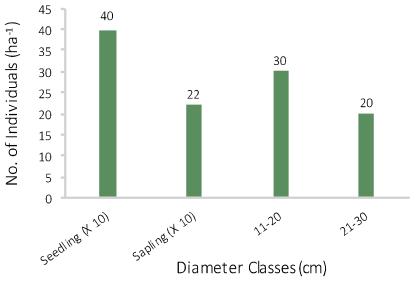
3C/C2a Moist Shiwalik Sal Forest (n=30)

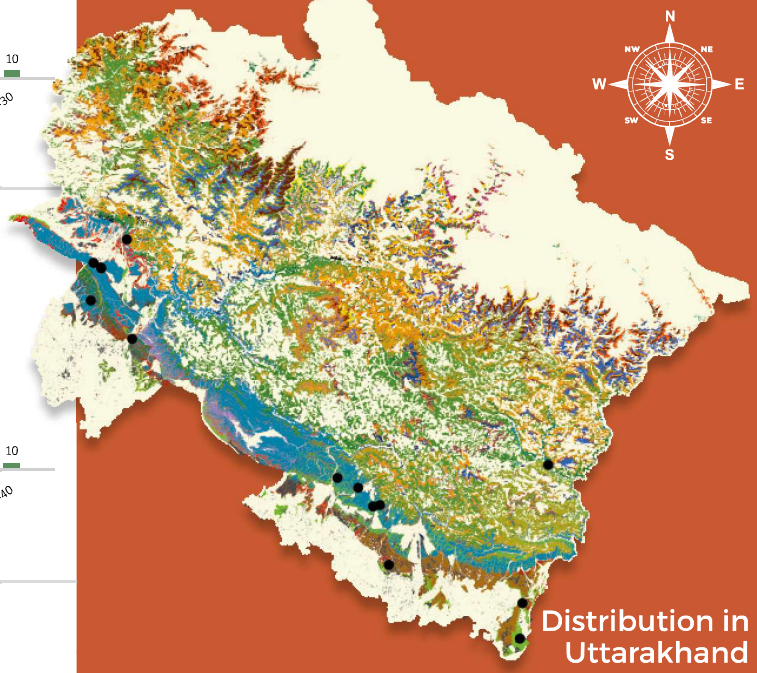


5B/C1a Dry Shiwalik Sal Forest (n=20)



5B/C1b Dry Plain Sal Forest (n=50)





Distribution in Uttarakhand

Species occurs in forest margins, streamsides, and sparse forests between 300-1,500 m.

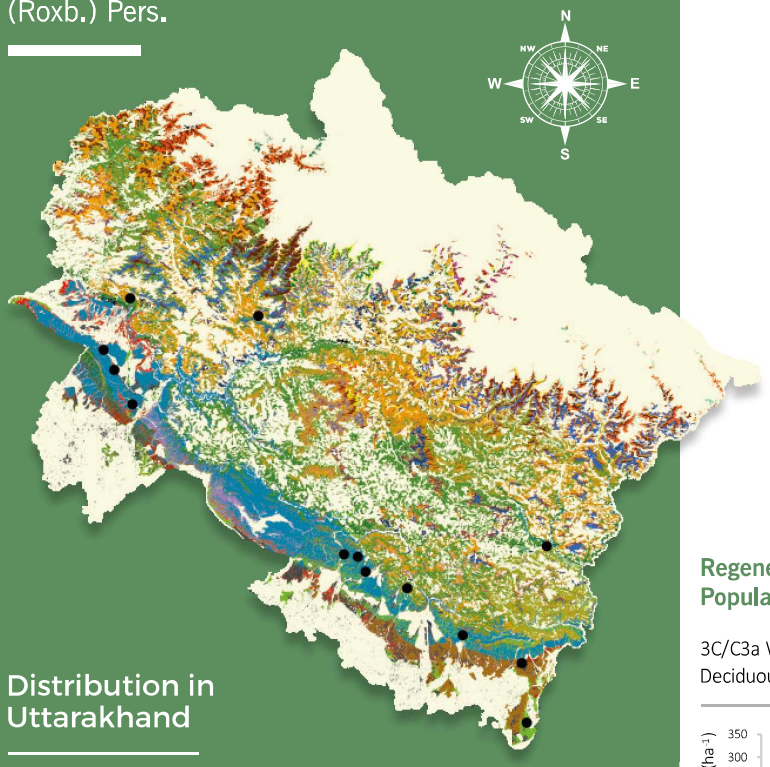
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b and 5B/C2.

Forest Divisions
Dehra Dun, Champawat, Mussoorie, Terai East, Terai Central, Terai West, Ramnagar, Kalsi Soil Conservation and Rajaji Tiger Reserve.

The species depicted 'good' regeneration in Moist Shiwalik Sal Forest, Dry Plain Sal Forest and Moist Terai Sal Forest while it was 'poor' in Moist Shiwalik Sal Forest. Highest seedling density value observed was 2,500 ha^{-1} in Moist Shiwalik Sal Forest. However, highest sapling density value recorded was 440 ha^{-1} in Moist Terai Sal Forest. Sapling stage was totally absent in Dry Shiwalik Sal Forest. Highest adult tree density value of 50 ha^{-1} in was recorded Dry Plain Sal Forest and Moist Terai Sal Forest. Population abundance was scanty and sparsely distributed, hence, suitable strategies are required for its conservation and improvement.

Litsea monopetala

(Roxb.) Pers.



Distribution in Uttarakhand

Species occurs up to 1,500 m.

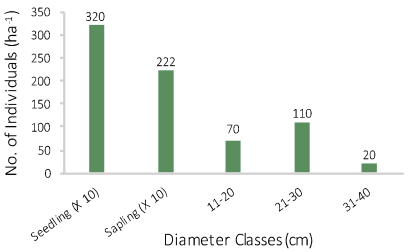
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C2d, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2, 9/C1a, 9/C1b, and 12/C1a.

Forest Divisions
Dehra Dum, Haridwar, Haldwani, Terai East, Terai West, Pithoragarh, Champawat, Ramnagar, Nainital, Tehri Dam –I, Mussoorie Rajaji Tiger Reserve, Kalsi Soil Conservation and Chakrata.

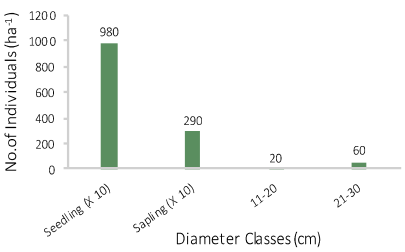
The species showed 'good' regeneration. Seedling density values observed were 9,800 ha^{-1} and 3,200 ha^{-1} in Upper or Himalayan Chir Pine Forest and West Gangetic Moist Mixed Deciduous Forest, respectively. Similar trend was observed in sapling stage with high density value of 290 ha^{-1} in Upper or Himalayan Chir Pine Forest. However, total adult tree density 190 ha^{-1} was higher in West Gangetic Moist Mixed Deciduous Forest. Proportion of lower and middle diameter classes was higher in adult population. Population was scatteredly distributed in its natural range, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=200)



9/C1b Upper or Himalayan Chir Pine Forest (n=80)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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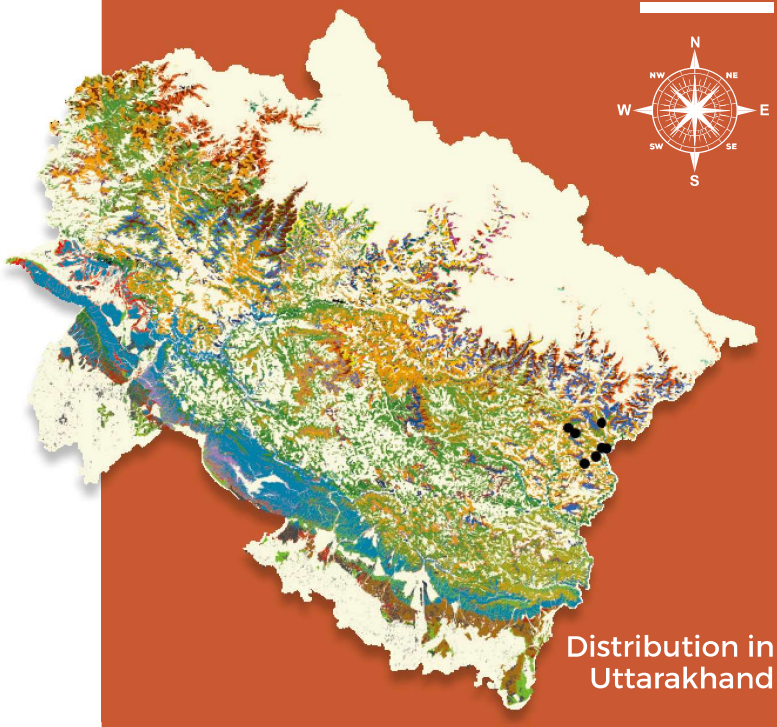
Pilot Project

Macaranga pustulata

King ex J. D. Hook. f.



Distribution in Uttarakhand

Species occurs in inner region up to 300-1,500 m

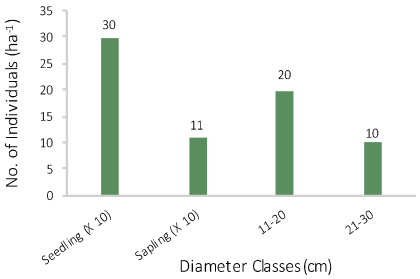
Occurrence in Forest Types
12/C1a and 12/C1b.

Forest Division
Pithoragarh.

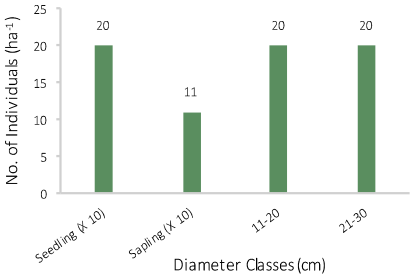
Overall regeneration of the species was 'good' in its natural distribution range. Values of seedling densities observed were 300 ha^{-1} and 200 ha^{-1} in Ban Oak Forest and Moru Oak Forest, respectively. Sapling density value recorded was 110 ha^{-1} in both forest types. Adult tree density values recorded were: 40 ha^{-1} and 30 ha^{-1} for Moru Oak Forest and Ban Oak Forest, respectively. Population is scanty and restricted to sub-tropical region of Pithoragarh. Hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=30)



12/C1b Moru Oak Forest (n=40)



Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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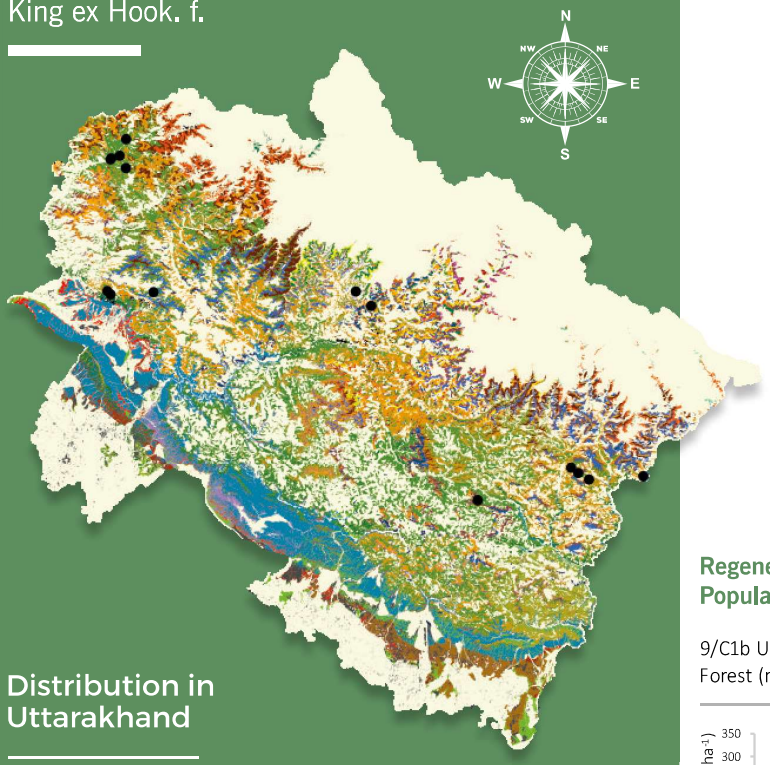
Uttarakhand State

Machilus duthiei

King ex Hook. f.



Distribution in Uttarakhand

Species occurs up to 1,500-2,200 m in shady riverine areas.

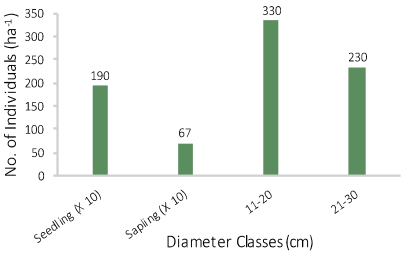
Occurrence in Forest Types
9/C1a, 9/C1b, 12/C1a, 12/C1b and 12/C1d.

Forest Divisions
Mussoorie, Kedarnath, Pithoragarh and Tons.

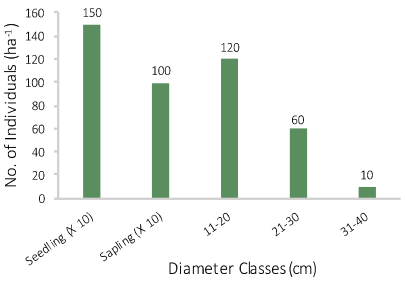
Overall regeneration status of the species was 'good' in its natural distribution range. Seedlings density values observed were 1,900 ha^{-1} and 1,500 ha^{-1} in Upper or Himalayan Chir Pine Forest and Ban Oak Forest, respectively. Sapling density values recorded were 670 ha^{-1} and 100 ha^{-1} in Upper or Himalayan Chir Pine Forest and Ban Oak Forest, respectively. Adult tree density value recorded was 560 ha^{-1} in Upper or Himalayan Chir Pine Forests and 190 ha^{-1} for Ban Oak Forest. Proportion of lower diameter class 11-20 cm was higher in adult population in both forest types indicating species is evolving. Wild population of species should be conserved for future, hence, suitable strategies are required for its conservation.

Regeneration Status and Population Structure

9/C1b Upper or Himalayan Chir Pine Forest (n=560)

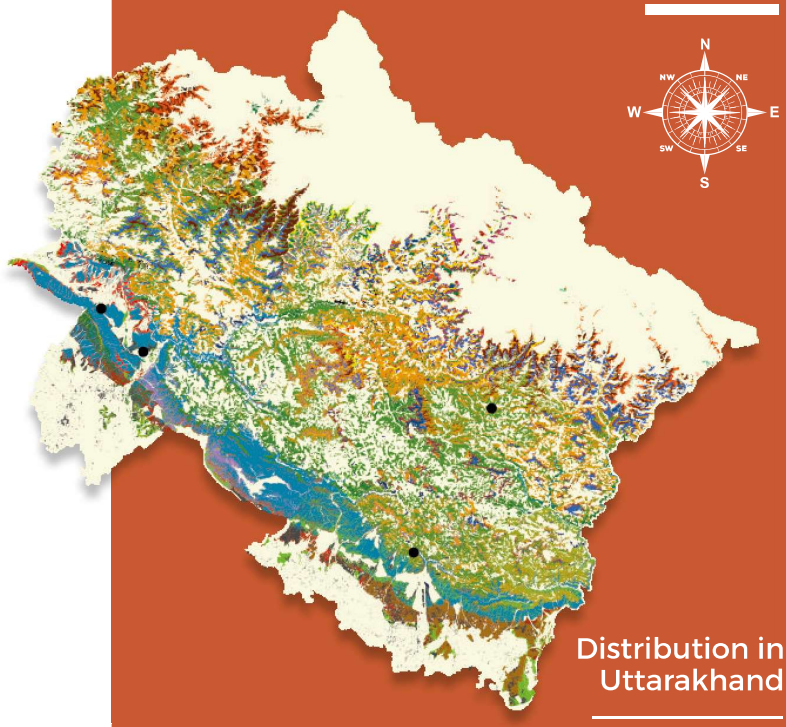


12/C1a Ban Oak Forest (n=190)



Machilus gamblei

King ex Hook. f.



Distribution in Uttarakhand

Species occurs up to 400-1,500 m in shady and swampy area.

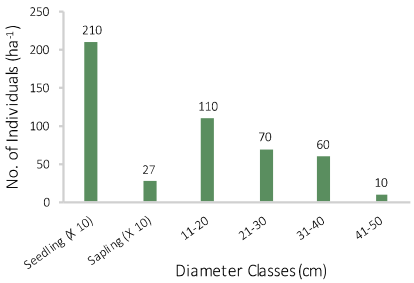
Occurrence in Forest Types
3C/C2a and 12/C1a.

Forest Divisions
Bageshwar, Dehra Dun, Nainital and Rajaji Tiger Reserve.

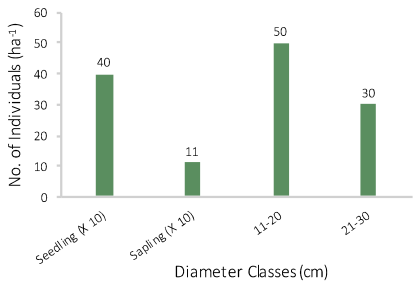
The species exhibited 'good' regeneration. Values of seedling and sapling densities observed were 2,100 ha^{-1} and 270 ha^{-1}, respectively. Adult tree density value recorded was 250 ha^{-1}. Higher number of individuals 110 ha^{-1} were recorded from 11-20 cm class. Species was sparsely distributed in its natural range. Hence, wild gene pool of the species is required to be conserved for future improvement programme.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=250)



3C/C2a Moist Shiwalik Sal Forest (n=80)



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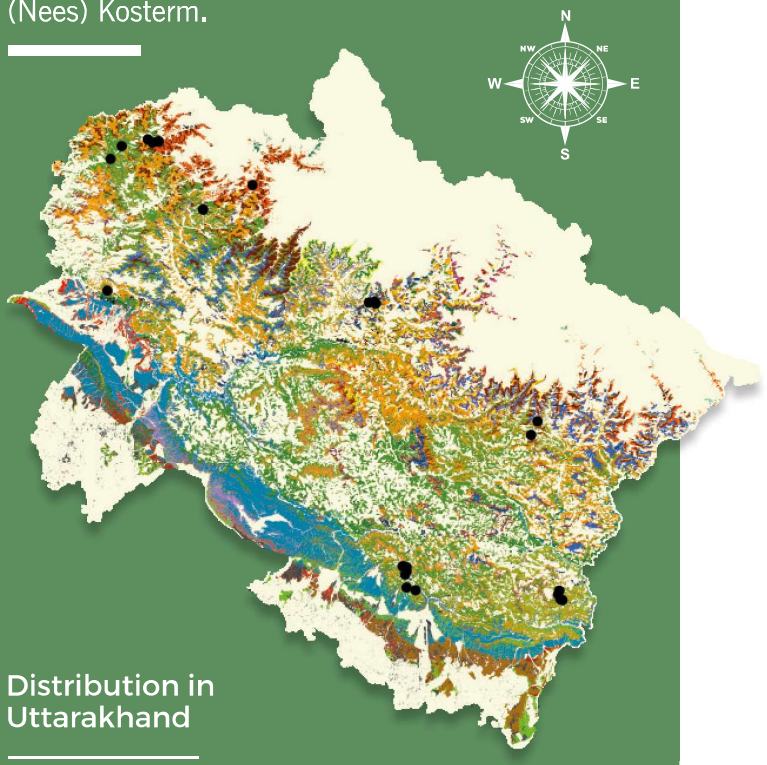
Uttarakhand State

Machilus odoratissima

(Nees) Kosterm.



Distribution in Uttarakhand

Occurs up to 900-1,900 m in Jaunsar, Tehri Garhwal and Outer Himalyan Valleys.

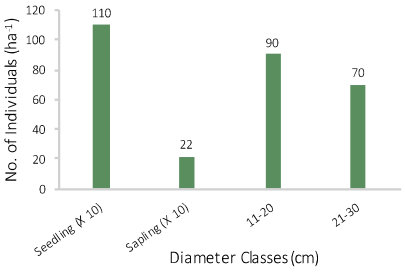
Occurrence in Forest Types
12/C1a and 12/C1b

Forest Divisions
Uttarkashi, Bageshwar, Nainital, Tons, Mussoorie and Champawat.

The species revealed 'good' regeneration. Seedling density value recorded was 1,100 ha^{-1} where sapling density value obtained was 220 ha^{-1}. Total adult tree density of 160 ha^{-1} was recorded, out of which 90 ha^{-1} was from lower diameter class of 11-20 cm. Population was scanty in its natural range, hence, suitable management strategies are required to be developed for its conservation

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n= 160)



Conservation of Forest Genetic Resources

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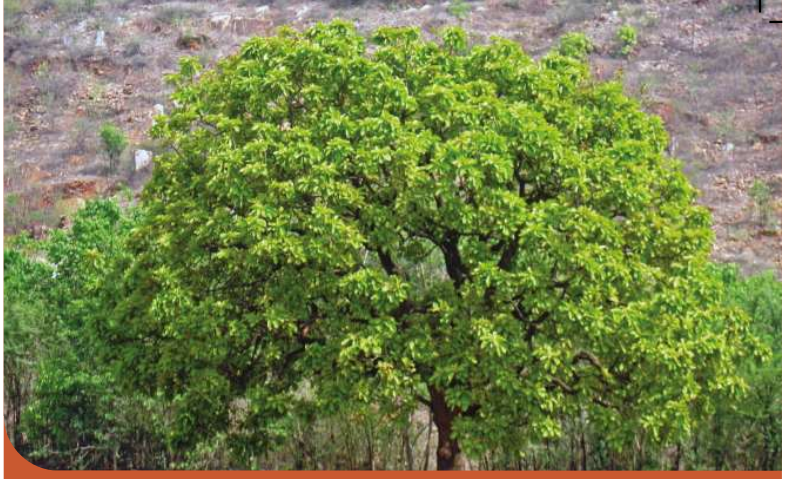


Madhuca longifolia

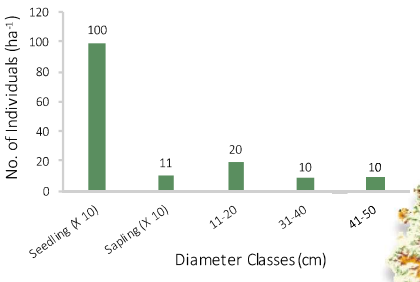
(J. Koenig ex L.) J. F. Macbr. var.

latifolia

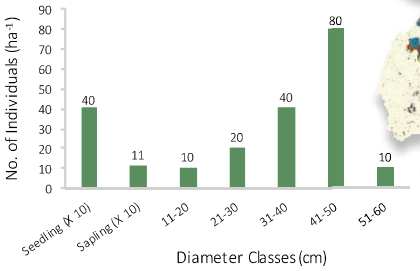
(Roxb.) A. Che

Regeneration Status and Population Structure

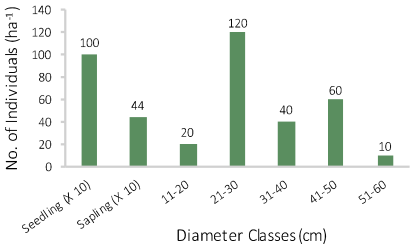
3C/C2a Moist Shiwalik Sal Forest (n=40)



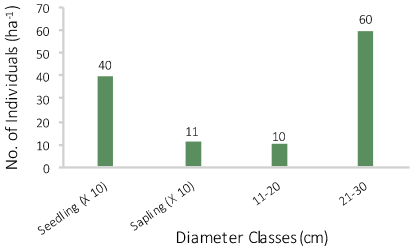
3C/C2c Moist Terai Sal Forest (n=160)

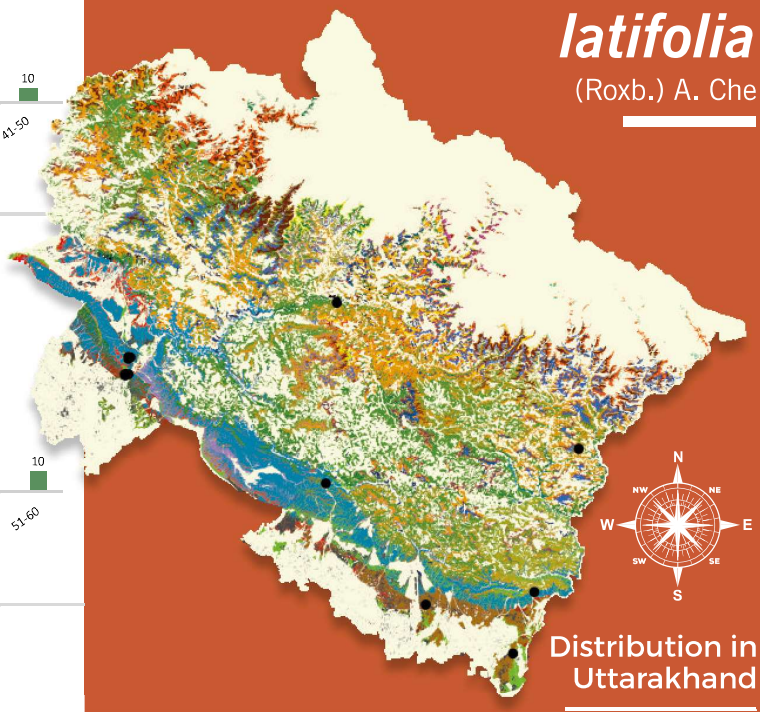


3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=250)



5B/C2 Northern Dry Mixed Deciduous Forest (n=70)





Distribution in Uttarakhand

Species occurs up to 1,200 m.

Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C2, 5/1S2 and 12/C1a.

Forest Divisions
Terai East, Haldwani, Champawat, Ramnagar and Rajaji Tiger Reserve.

The species depicted 'good' regeneration in its natural range. Highest seedling density value recorded was 1,000 ha^{-1} in Moist Shiwalik Sal Forest and West Gangetic Moist Mixed Deciduous Forest. Highest sapling density value recorded was 440 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest. Highest adult tree density value 250 ha^{-1} was recorded in Moist Shiwalik Sal Forest while lowest value was of 40 ha^{-1}. Adult trees with higher diameter class up to 51-60 cm were recorded in Moist Terai Sal Forest and West Gangetic Moist Mixed Deciduous Forest. Species is economically important for its flowers and seed. Hence, suitable strategies are required to be developed for its conservation and improvement.

Mangifera indica

L.

Distribution in Uttarakhand

Species occurs very sporadically in forests up to 900 m in shady and moist ravines.

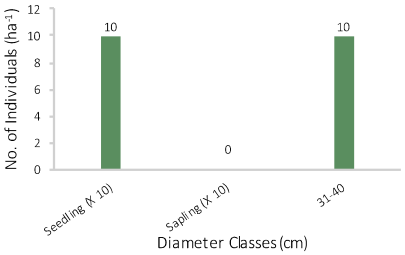
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 9/C1a and Plantations.

Forest Divisions
Champawat, Ramnagar, Nainital, Narendranagar, Tons, Dehra Dun, Rajaji Tiger Reserve, Nandhaur Wildlife Sanctuary and Lansdowne.

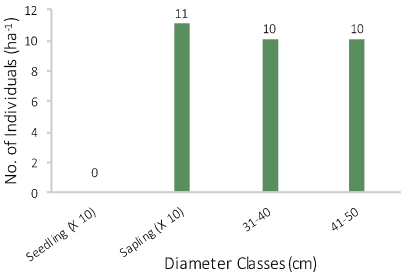
The species depicted 'good' regeneration in Moist Terai Sal Forest and Northern Dry Mixed Deciduous Forest while it exhibited 'poor' regeneration in Dry Shiwalik Sal Forest, and 'fair' regeneration in Lower or Shiwalik Chir Pine Forest. Highest seedling density value recorded was 1,600 ha^{-1} in Northern Dry Mixed Deciduous. Seedling stage was conspicuously absent in Dry Shiwalik Sal Forest. Values of sapling density were also low in all forest types. Adult tree density value obtained was 20 ha^{-1} in assessed forest types except Lower or Shiwalik Chir Pine Forest where it was only 10 ha^{-1}. Species is economically very important, wild gene pool should be conserved for future improvement programme. Species was scatteredly distributed in natural range, hence, suitable strategies are required for its conservation.

Regeneration Status and Population Structure

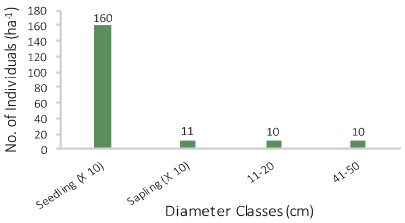
9/C1a Lower or Shiwalik Chir Pine Forest (n=10)



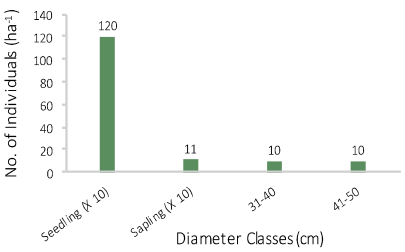
5B/C1a Dry Shiwalik Sal Forest (n=20)



5B/C2 Northern Dry Mixed Deciduous Forest (n=20)



3C/C2c Moist Terai Sal Forest (n=20)



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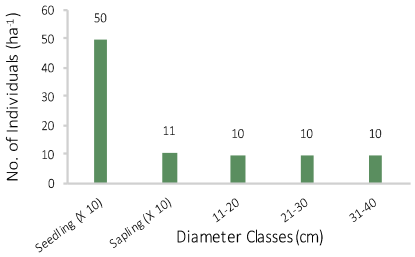
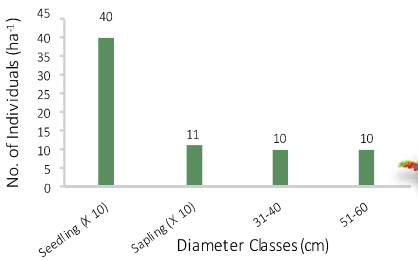
Regeneration Status and Population Structure

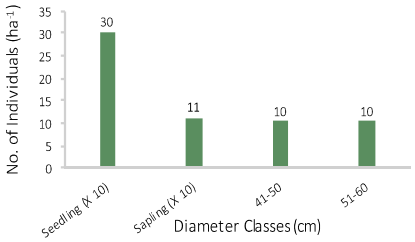
9/DS1 Himalayan Subtropical Scrub (n=30)



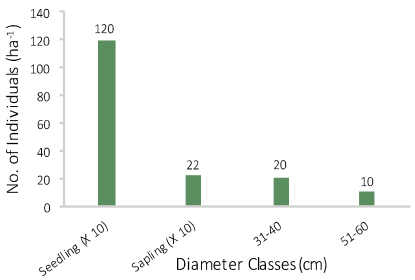
5B/C2 Northern Dry Mixed Deciduous Forest (n=20)



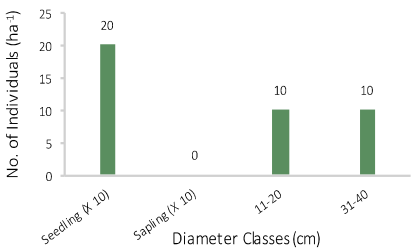
3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)



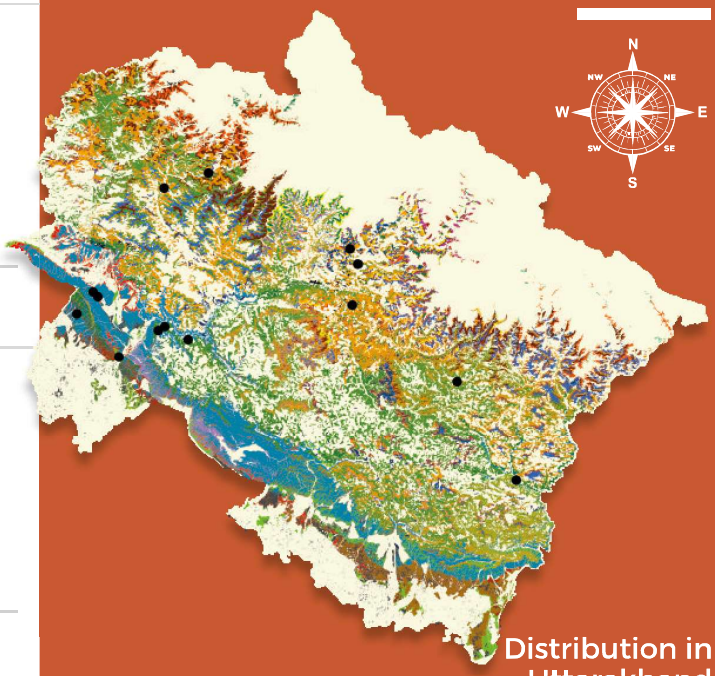
3C/C2a Moist Shiwalik Sal Forest (n=30)



9/C1a Lower or Shiwalik Chir Pine Forest (n=20)



Melia azedarach L.



Distribution in Uttarakhand

Species occurs up to 1,200 m.

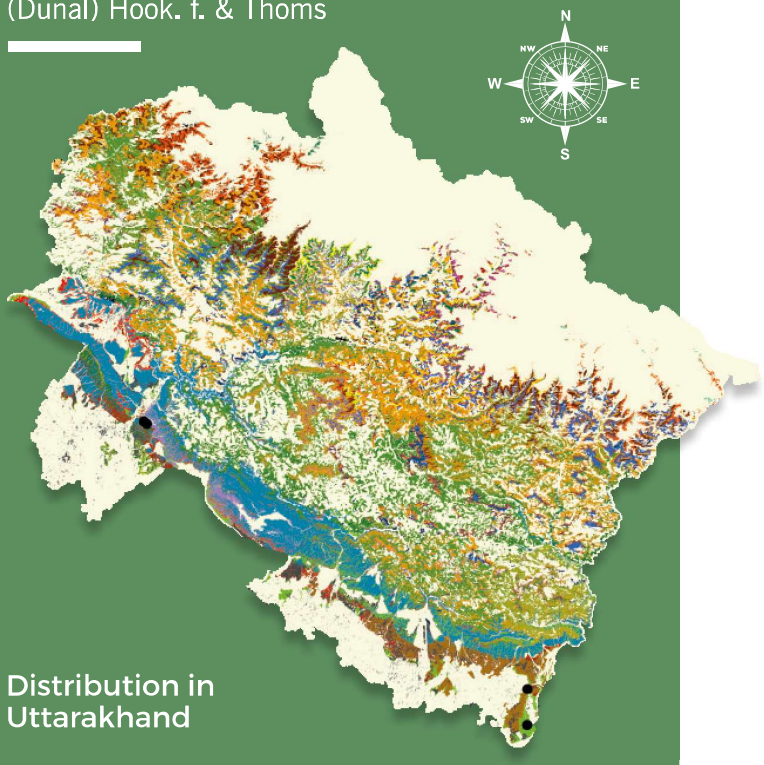
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 9/C1a, 9/C1b, 9/DS1, and 12/C1a.

Forest Divisions
Pithoragarh, Champawat, Dehra Dun, Mussoorie, Uttarkashi, Bageshwar, Chakrata, Nandprayag, Lansdowne and Rajaji Tiger reserve.

The species depicted 'good, regeneration in Himalayan Subtropical Scrub, Northern Dry Mixed Deciduous Forest, West Gangetic Moist Mixed Deciduous Forest and Moist Shiwalik Sal Forest. In Lower or Shiwalik Chir Pine Forest, observed regeneration was 'fair'. Highest values of seedling and sapling densities recorded were 1,200 ha^{-1} and 220 ha^{-1}, respectively in Moist Shiwalik Sal Forest. Overall adult tree density was low with the highest value of 30 ha^{-1} recorded in Himalayan Subtropical Scrub and Moist Shiwalik Sal Forest. Adult tree population was quite low in all forest types, hence, suitable strategies are required for its conservation and improvement.

Miliusa velutina

(Dunal) Hook. f. & Thoms



Distribution in Uttarakhand

Species occurs in the Outer or Shiwalik Hills up to 900 m.

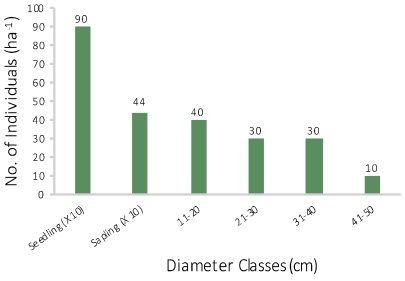
Occurrence in Forest Types
3C/C3a and 5B/C1b.

Forest Divisions
Terai East and Rajaji Tiger Reserve

The species was showed 'good' regeneration. Values of seedling and sapling densities observed were 900 ha^{-1} and 440 ha^{-1}, respectively. Adult tree density value of 100 ha^{-1} was recorded. High density value of 40 ha^{-1} was obtained in lower diameter class of 11-20 cm. Species was sparsely distributed in its natural range. Hence, wild gene pool of the species is required to be conserved for future improvement programme.

Regeneration Status and Population Structure

5B/C1b Dry Plain Sal Forest (n=110)



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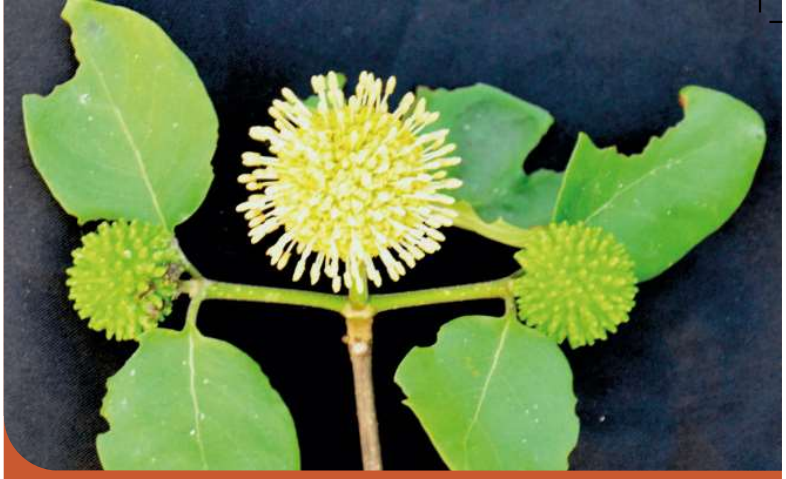
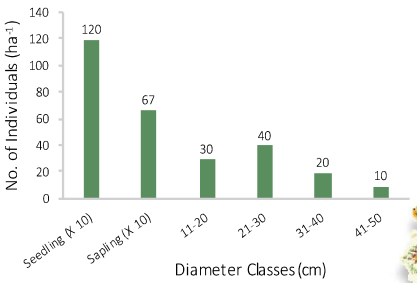


Mitragyna parvifolia

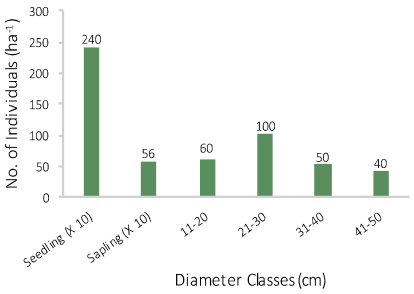
(Roxb.) Korth.

Regeneration Status and Population Structure

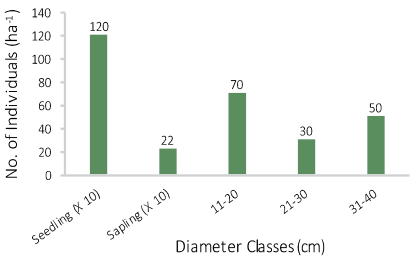
5/DS1 Dry Deciduous Scrub (n=100)

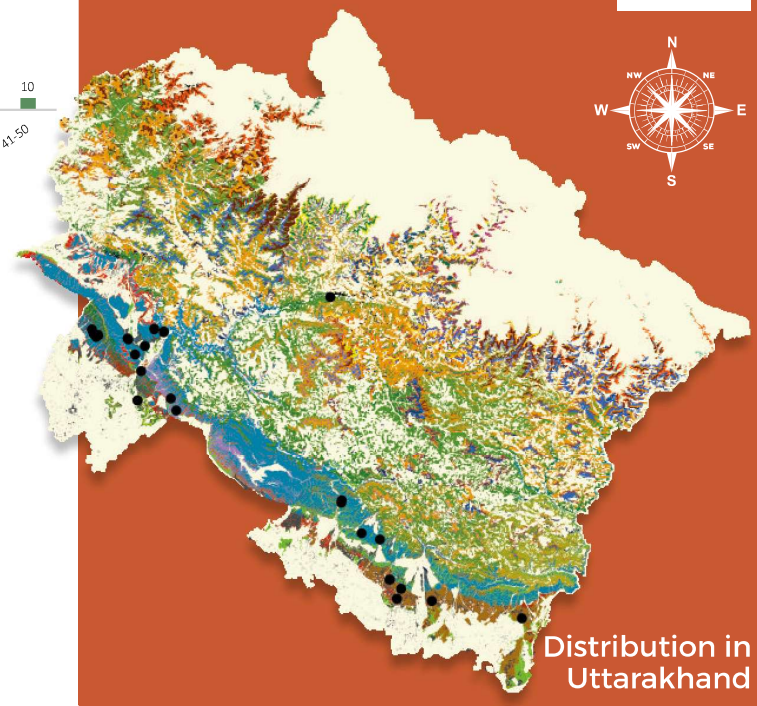


3C/C2c Moist Terai Sal Forest (n=250)



5B/C2 Northern Dry Mixed Deciduous Forest (n=150)





Distribution in Uttarakhand

Species occurs up to 1,300 m in riverine areas.

Occurrence in Forest Types

3C/C2a, 3C/C2c, 3C/C3a, 5B/C2, 5/DS1, 5/1S2, 9/C1a and 9/C1b.

Forest Divisions

Terai East, Terai West, Haldwani, Kalsi Soil Conservation, Ramnagar, Rudraprayag, Dehra Dun, Terai Central, Narendranagar, Lansdowne, Haridwar and Rajaji Tiger Reserve.

The species exhibited 'good' regeneration. Highest seedling density value observed was 2,400 ha^{-1} in Moist Terai Sal Forest while it was 1,200 ha^{-1} in Dry Deciduous Scrub and Northern Dry Mixed Deciduous Forest. Values of sapling density recorded were 670 ha^{-1}, 560 ha^{-1} and 220 ha^{-1} in Dry Deciduous Scrub, Moist Terai Sal Forest and Northern Dry Mixed Deciduous Forest, respectively. Highest total adult tree density value recorded was 250 ha^{-1} in Moist Terai Sal Forest. Highest number of individuals (100 ha^{-1}) were observed from 21-30 cm diameter class. Population was scatteredly distributed in its natural range, hence, suitable strategies are required for its conservation and improvement.

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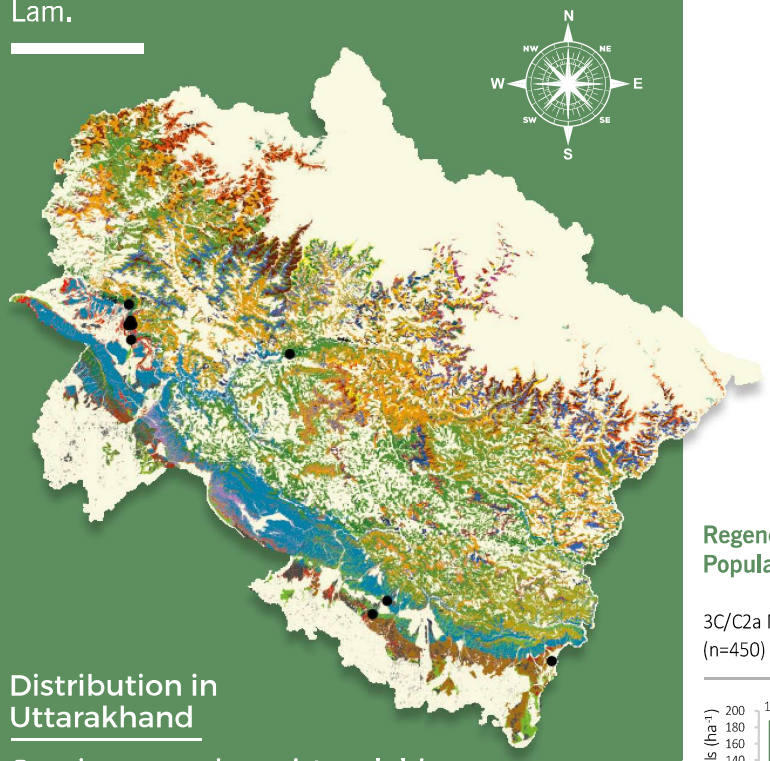
Moringa oleifera

Lam.



Distribution in Uttarakhand

Species occurs in moist and drier localities up to 900 m. Mostly cultivated but escaped to forests.

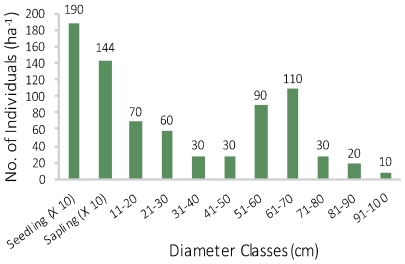
Occurrence in Forest Types
3C/C2a, 3C/C2c, 5B/C1a, 5B/C2, 5/1S2 and 9/C1b.

Forest Divisions
Terai East, Ramnagar, Rudraprayag, Dehra Dun, Terai Central, Narendranagar and Lansdowne

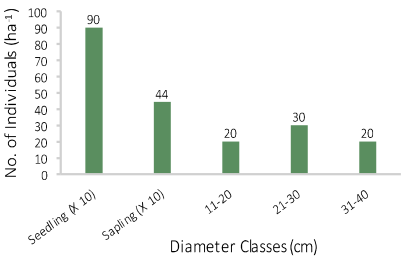
Overall regeneration of the species was 'good'. However, proportion of density values of seedlings, saplings and adults showed variety. Seedling densities value reported were 1,900 ha^{-1} and 900 ha^{-1} in Moist Shiwalik Sal Forest and Northern Dry Mixed Deciduous Forest, respectively. Same trend was observed in sapling with density value of 1,440 ha^{-1} in Moist Shiwalik Sal Forest and 440 ha^{-1} in Northern Dry Mixed Deciduous Forest. Total adult tree density of 450 ha^{-1} was recorded for Moist Shiwalik Sal Forest while it was 70 ha^{-1} for Northern Dry Mixed Deciduous Forest. In Moist Shiwalik Sal Forest, higher number of adult individuals were recorded from 51-60 cm and 61-70 cm diameter classes. Species is very important for its fruit, therefore, wild gene pool should be conserved. Suitable management strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

3C/C2a Moist Shiwalik Sal Forest (n=450)



5B/C2 Northern Dry Mixed Deciduous Forest (n=70)



Conservation of Forest Genetic Resources

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Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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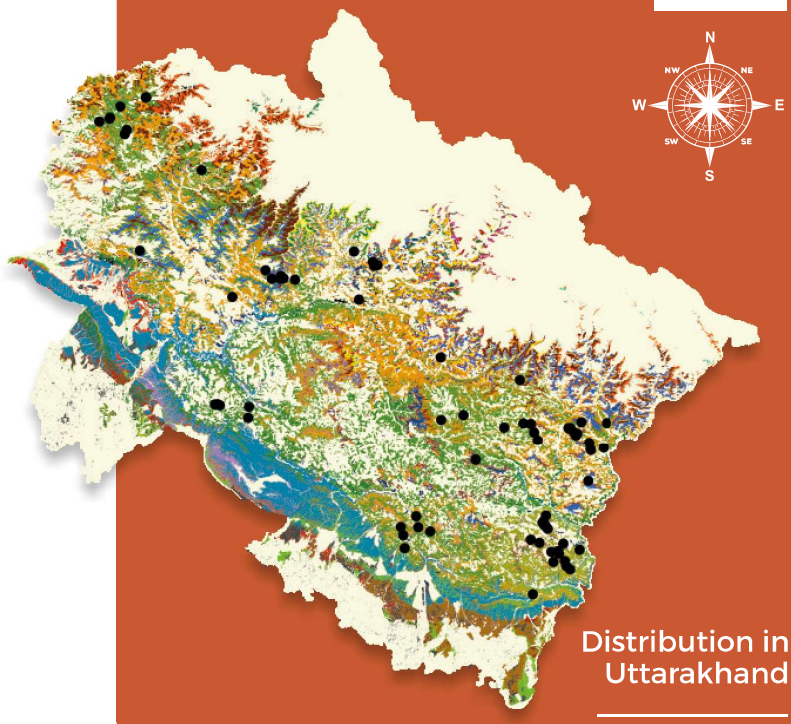
Uttarakhand State

Myrica esculenta

Buch.-Ham. ex D. Don



Distribution in Uttarakhand

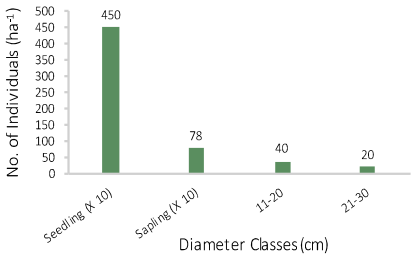
Species occurs up to 1,400-2,500 m.

Occurrence in Forest Types
9/C1a, 9/C1b, 9/DS1, 9/DS2, 12/C1a, 12/C1b, 12/C1c, 12/C1d, 12/1S1, 12/C1f and 12/C2b.

Forest Divisions
Nainital, Chakrata, Uttarkashi, Bageshwar, Tons, Pithoragarh, Kedarnath, Rudraprayag, Mussoorie and Champawat.

Regeneration Status and Population Structure

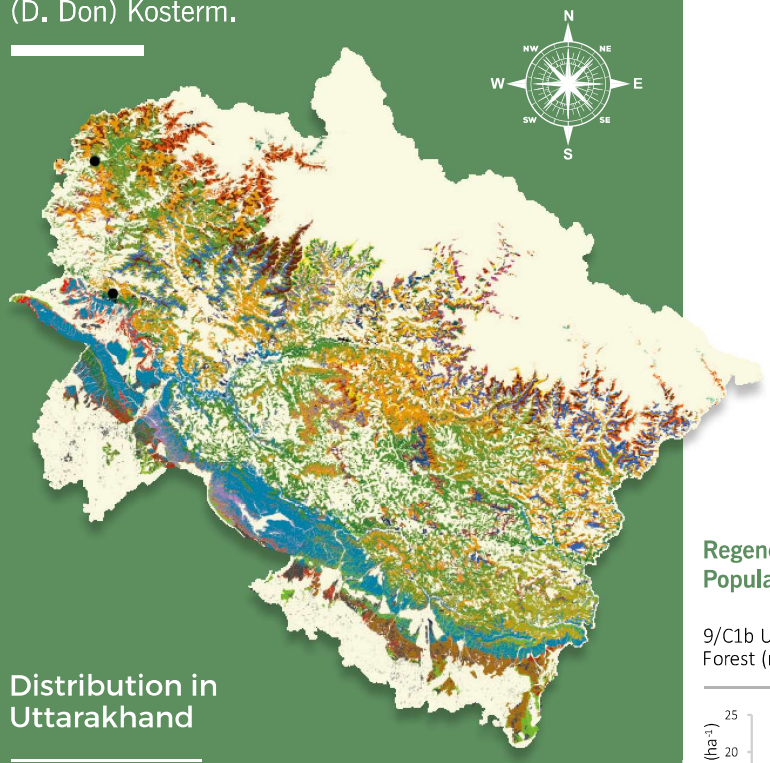
9/C1b Upper or Himalayan Chir Pine Forest (n=60)



The species exhibited 'good' regeneration. Values of seedling and sapling density recorded were 4,500 ha^{-1} and 780 ha^{-1}, respectively. Adult tree density values observed were 60 ha^{-1} from diameter classes of 11-20 cm (40 ha^{-1}) and 21-30 cm (20 ha^{-1}). Population was scanty, hence, suitable management strategies are required to be developed for its conservation and improvement.

Neolitsea cuipala

(D. Don) Kosterm.



Distribution in Uttarakhand

Species occurs up to 2,000 m.

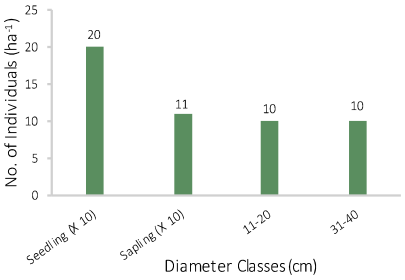
Occurrence in Forest Types
9/C1b and 12/C1a

Forest Divisions
Mussoorie and Chakrata.

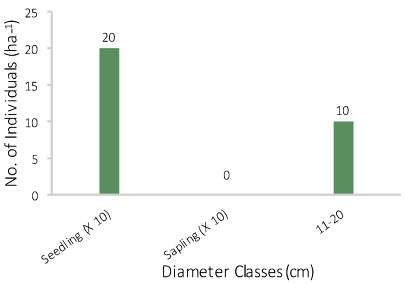
The species depicted 'good' regeneration in Ban Oak Forest and 'fair' regeneration in Upper or Himalayan Chir Pine Forest. Seedling density value observed was 200 ha^{-1} in both forest types. Sapling density value recorded was 110 ha^{-1} in Upper or Himalayan Chir Pine Forest while in Ban Oak Forest sapling stage was altogether absent indicating disturbances in the area. Adult tree density values observed were 10 ha^{-1} and 20 ha^{-1} in Ban Oak Forest and Upper or Himalayan Chir Pine Forest, respectively. Adult population was meagre, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

9/C1b Upper or Himalayan Chir Pine Forest (n=20)



12/C1a Ban Oak Forest (n=10)



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Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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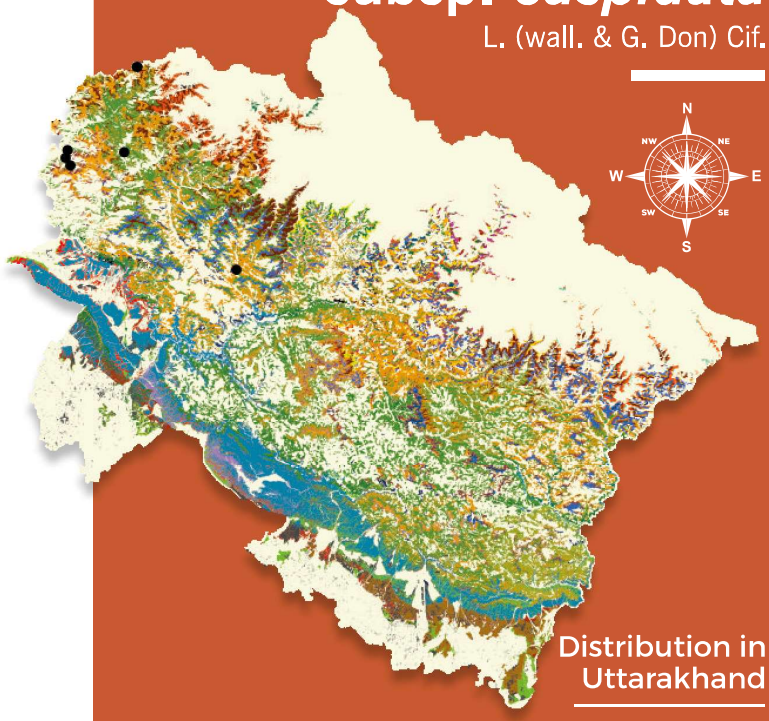
Uttarakhand State

Olea europaea subsp. *cuspidata*

L. (wall. & G. Don) Cif.



Distribution in Uttarakhand

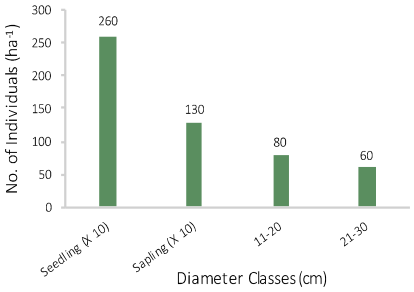
Species occurs between 700 and 1,600 m.

Occurrence in Forest Types
9/C1b, 12/C1a and 12/C2c.

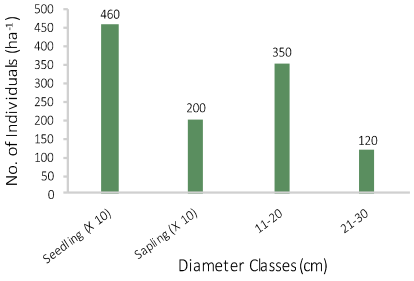
Forest Divisions
Mussoorie, Upper Yamuna, Chakrata, Tehri Dam-I and Tons.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=140)



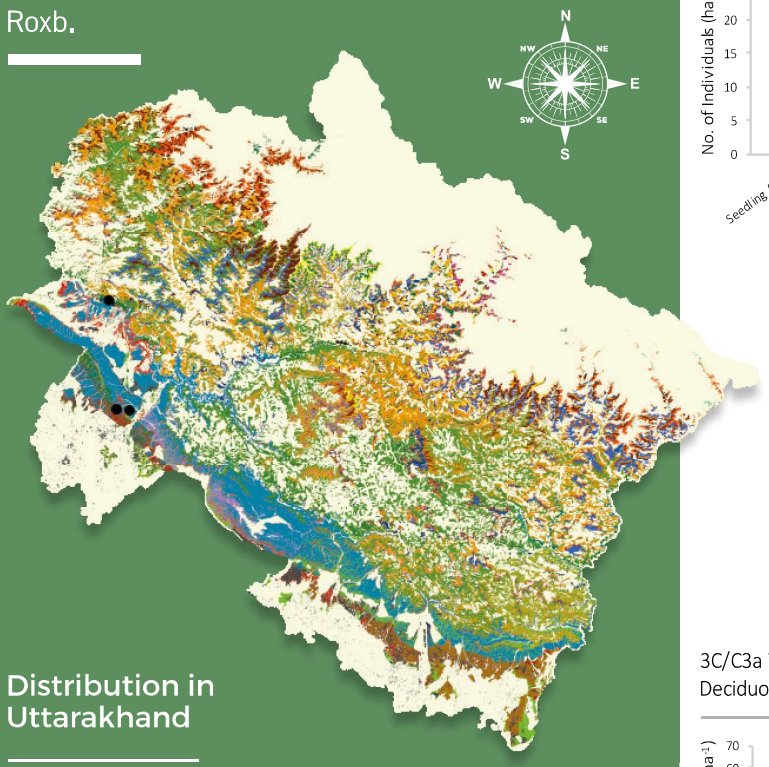
9/C1b Upper or Himalayan Chir Pine Forest (n=470)



The species revealed 'good' regeneration in its natural distribution range. Values of seedling density observed were 4,600 ha^{-1} and 2,600 ha^{-1} in Upper or Himalayan Chir Pine Forest and Ban Oak Forest, respectively. Values of sapling density recorded were 2,000 ha^{-1} and 1,300 ha^{-1} in upper or Himalayan Chir Pine Forest and Ban Oak Forest, respectively. Adult tree density value recorded was 470 ha^{-1} in Upper or Himalayan Chir Pine Forest and 160 ha^{-1} for Ban Oak Forest. Higher proportion in lower diversity class i.e., 10-21cm was observed in both forest types. European species is economically important for its oil properties and content, therefore, species may be of potential use in future improvement programme. Wild population of species should to be conserved for future, hence, suitable strategies are required for its conservation.

Olea paniculata

Roxb.



Distribution in Uttarakhand

Species occurs up to 400-2,000 m in shady ravines.

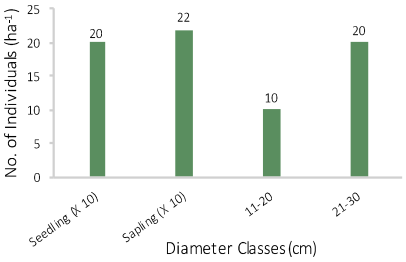
Occurrence in Forest Types
3C/C2a, 3C/C3a, 5B/C2, 9/C1a and 9/DS2.

Forest Divisions
Tehri, Chakrata, Mussoorie and Ramnagar.

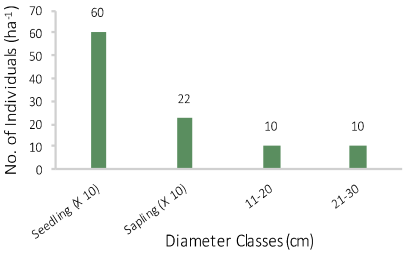
The species exhibited 'good' regeneration in West Gangetic Moist Mixed Deciduous Forest while 'fair' regeneration in Lower or Shiwalik Chir Pine Forest and Northern Dry Mixed Deciduous Forest. Highest seedling density value of 600-1 was obtained in West Gangetic Moist Mixed Deciduous Forest. Sapling density values of 220 ha^{-1} were recorded in West Gangetic Moist Mixed Deciduous Forest and Northern Dry Mixed Deciduous Forest. Overall low adult tree density was observed. Adult tree population was meagre, hence, suitable strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

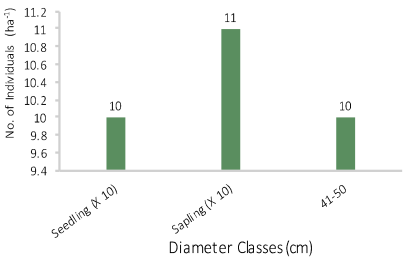
5B/C2 Northern Dry Mixed Deciduous Forest (n=30)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=20)



9/C1a Lower or Shiwalik Chir Pine Forest (n=10)



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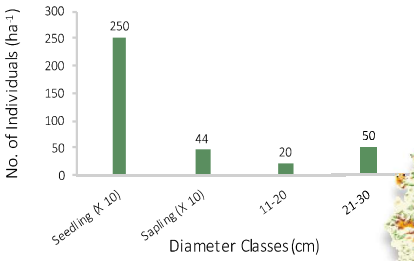
Oroxylum indicum

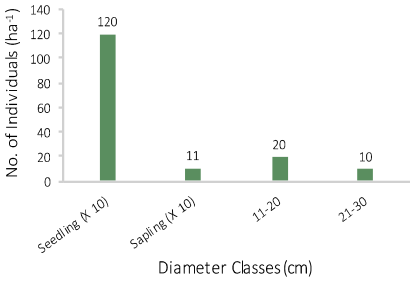
(L.) Kurz

Regeneration Status and Population Structure

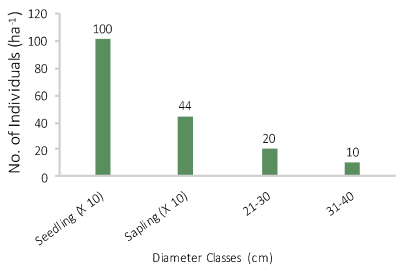
5B/C2 Northern Dry Mixed Deciduous Forest (n=70)

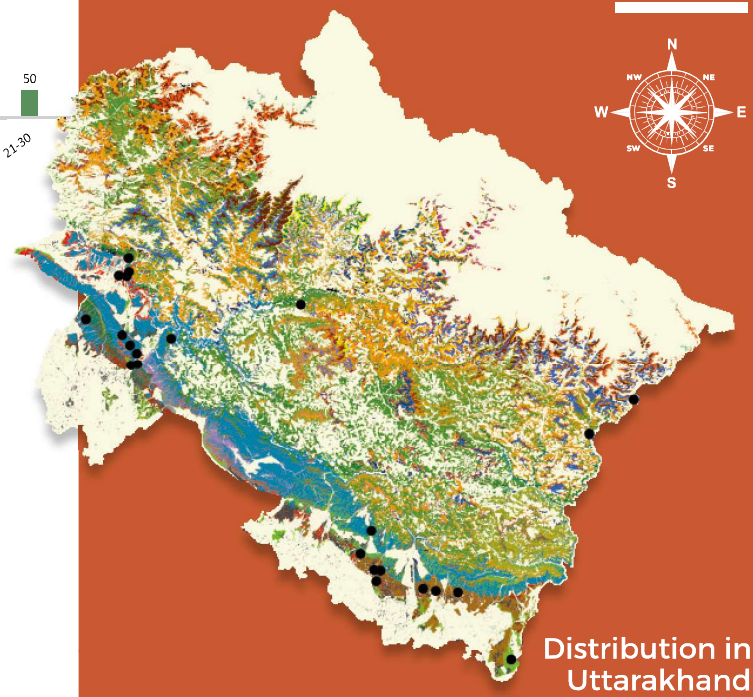


5B/C1a Dry Shiwalik Sal Forest (n=30)



3C/C2c Moist Terai Sal Forest (n=30)





Distribution in Uttarakhand

Species occurs up to 900 m in open miscellaneous forests.

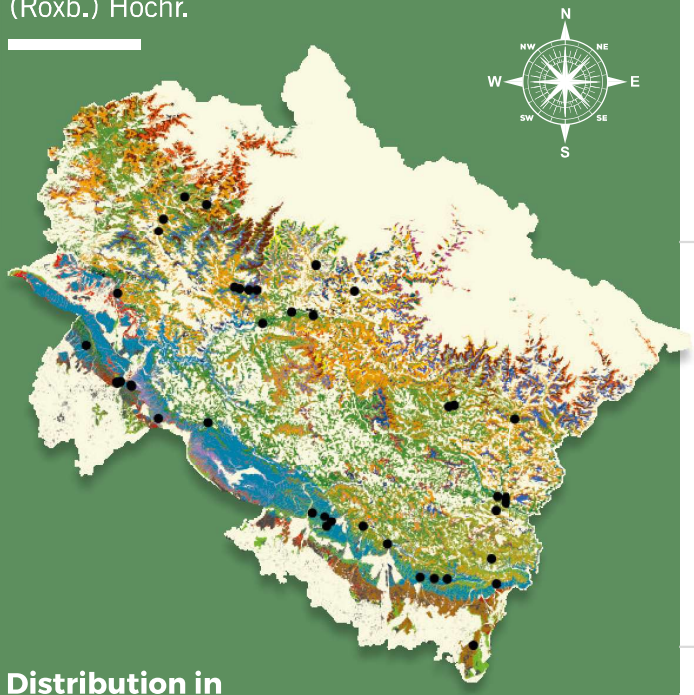
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 9/C1a and 9/C1b.

Forest Divisions
Terai East, Terai West, Dehra Dun, Kalsi Soil Conservation, Mussoorie, Pithoragarh, Lansdowne, Rudraprayag, Ramnagar, Terai Central and Rajaji Tiger Reserve.

The species exhibited overall 'good' regeneration. However, proportion of different regeneration stages showed variation. Highest seedling density value 2,500 ha^{-1} was observed in Northern Dry Mixed Deciduous Forest, followed by 1,200 ha^{-1} in Dry Shiwalik Sal Forest and 1,000 ha^{-1} in Moist Terai Sal Forest. Sapling density value estimated was 440 ha^{-1} in Northern Dry Mixed Deciduous Forest and Moist Terai Sal Forest while it was 110 ha^{-1} for Dry Terai Sal Forest. Overall adult tree density was low with maximum value of 70 ha^{-1} for Northern Dry Mixed Deciduous Forest. Adult individuals up to diameter class of 31-40 cm were observed. Species is very important being one of ingredients of 'Dashmularisht' an Ayurvedic medicine. Species was scantly distributed in its natural range, hence, suitable strategies are required to be developed for its conservation and improvement.

Ougeinia oojeinensis

(Roxb.) Hochr.



Distribution in Uttarakhand

Species occurs up to 1,600 m.

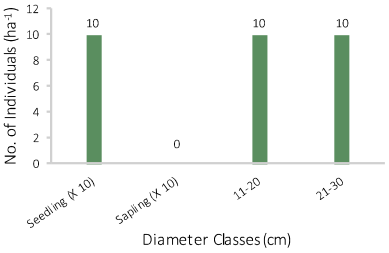
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, 5/1S2, 9/C1a, 9/C1b, 9/DS2 and 12/C1a.

Forest Divisions
Champawat, Dehra Dun, Kalsi Soil Conservation, Terai East, Mussoorie, Pithoragarh, Ramnagar, Uttarkashi, Bageshwar, Nainital, Chakrata, Rudraprayag, Kedarnath and Lansdowne.

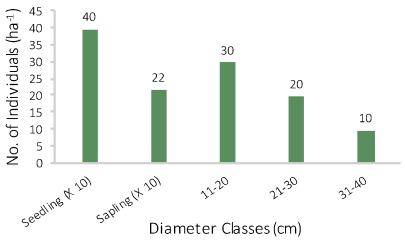
The species depicted 'good' regeneration in three assessed forest types, however, in Ban Oak Forest it was observed 'fair'. Highest seedling density value observed was 400 ha^{-1} in three forest types viz. Upper or Himalayan Chir Pine Forest, Upper or Himalayan Chir Pine Forest, West Gangetic Moist Mixed Deciduous Forest and Northern Dry Mixed Deciduous Forest. Highest sapling density was recorded in Upper or Himalayan Chir Pine Forest while there no sapling stage was observed in Ban Oak Forest indicating human disturbances. Overall population in adult tree was low. Highest value observed was 60 ha^{-1} in Upper or Himalayan Chir Pine Forest and lowest was 20 ha^{-1} in Ban Oak Forest. Maximum contribution to adult tree density was from 11-20 cm and 21-30 cm diameter classes. Adult tree population was quite low in all assessed forest types, hence, suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

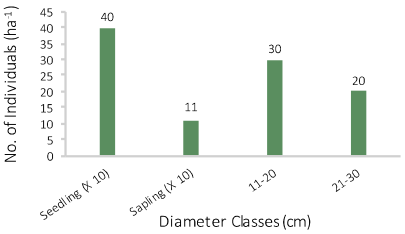
12/C1a Ban Oak Forest (n=20)



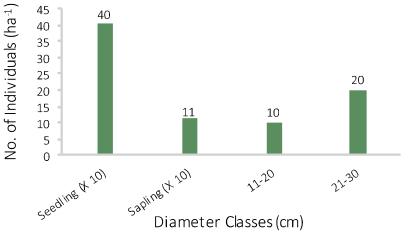
9/C1b Upper or Himalayan Chir Pine Forest (n=60)



3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=50)



5B/C2 Northern Dry Mixed Deciduous Forest (n=30)



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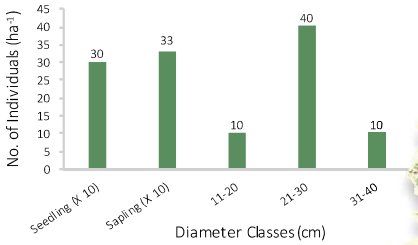
Phanera retusa

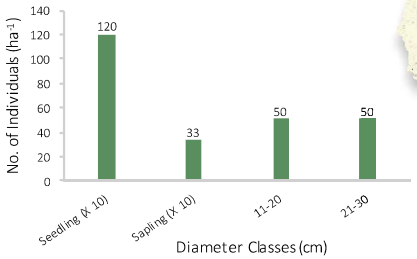
Benth.

Regeneration Status and Population Structure

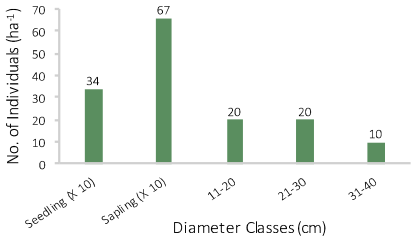
5B/C2 Northern Dry Mixed Deciduous Forest (n=60)



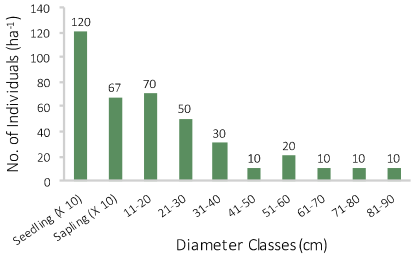
12/C1a Ban Oak Forest (n=50)

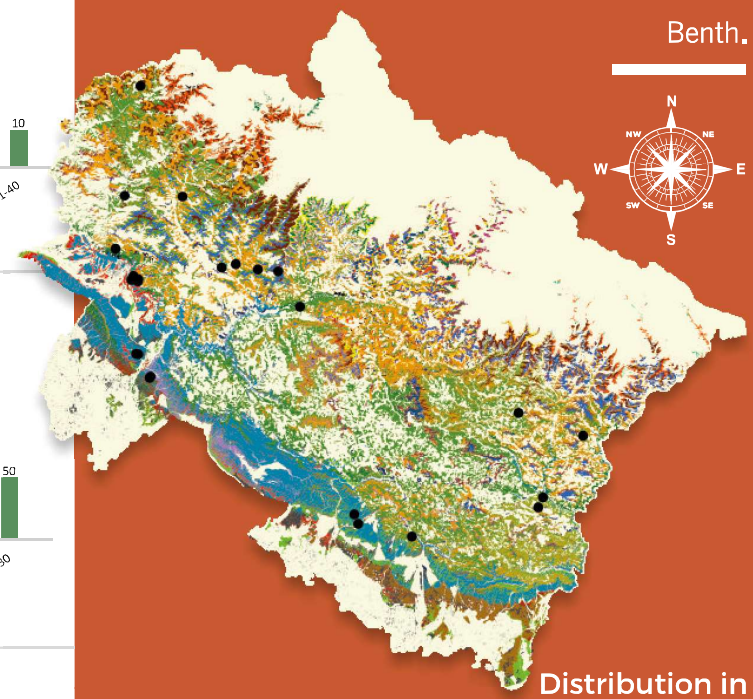


9/C1b Upper or Himalayan Chir Pine Forest (n=50)



5B/C1a Dry Shiwalik Sal Forest (n=210)





Distribution in Uttarakhand

Species occurs between 200 to 1,300 m in the forests.

Occurrence in Forest Types

3C/C2a, 3C/C3a, 5B/C1a, 5B/C2, 5/1S2, 9/C1a, 9/C1b, 9/DS1 and 12/C1a

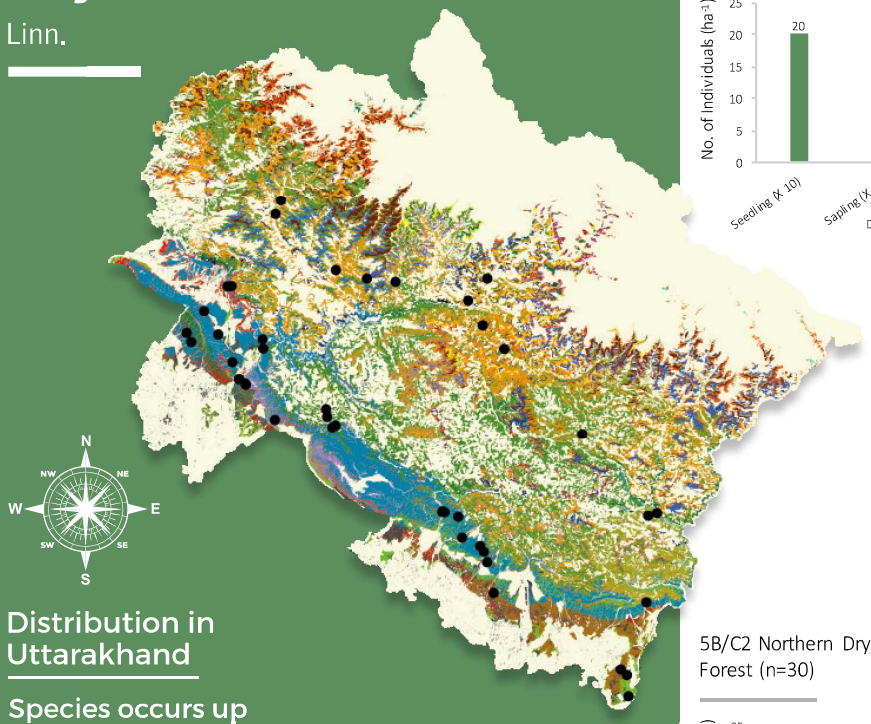
Forest Divisions

Dehra Dun, Champawat, Ramnagar, Uttarkashi, Nainital, Upper Yamuna, Tehri, Tehri Dam –I, Mussoorie, Tons and Rajaji Tiger Reserve

Overall regeneration status of the species was 'good' except in Northern Dry Mixed Deciduous Forest 'fair' regeneration was observed. Highest seedling density value recorded was 1,200 ha^{-1} in Dry Shiwalik Sal Forest while lowest value of 300 ha^{-1} was in Northern Dry Mixed Deciduous Forest. Sapling density of 670 ha^{-1} was obtained for Dry Shiwalik Sal Forest and Upper or Himalayan Chir Pine Forest while it was 330 ha^{-1} for Ban Oak Forest and Northern Dry Mixed Deciduous Forest. Highest adult tree density value observed of 210 ha^{-1} was observed in Dry Shiwalik Sal Forest while lowest value of 50 ha^{-1} was in Upper or Himalayan Chir Pine Forest. Maximum adult trees recorded were up to diameter classes of 31-40 cm, however, in Dry Shiwalik Sal Forest higher diameter classes were recorded. Wild gene pool of the species should be conserved for future. Hence, suitable strategies are required for its conservation.

Phyllanthus emblica

Linn.



Distribution in Uttarakhand

Species occurs up to 1,800 m.

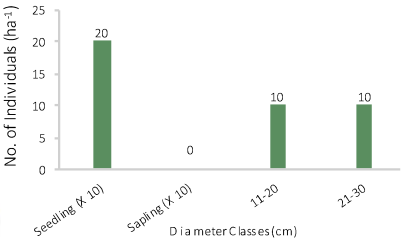
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C2, 5/DS1, 9/C1a, 9/C1b, 12/C1a and Plantations.

Forest Divisions
Champawat, Terai East, Pithoragarh, Ramnagar, Uttarkashi, Badrinath, Dehra Dun, Mussoorie, Rudraprayag, Tehri Dam-I, Tehri, Chakrata, Narendranagar, Lansdowne, Terai Central, Rajaji Tiger Reserve and Kedarnath Wildlife Sanctuary.

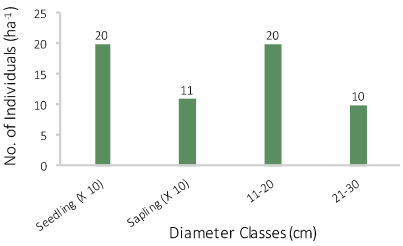
The species exhibited 'good' regeneration in Northern Dry Mixed Deciduous Forest and Moist Shiwalik Sal Forest while 'fair' regeneration was observed in Lower or Shiwalik Chir Pine Forest. Highest seedling density value observed was 1,000 ha^{-1} in Moist Shiwalik Sal Forest while density of 200 ha^{-1} was recorded in Lower or Shiwalik Chir Pine Forest and Northern Dry Mixed Deciduous Forest. Highest sapling density value estimated was 220 ha^{-1} in Moist Shiwalik Sal Forest. Overall adult tree density was low with maximum of 30 individuals' ha^{-1} for Northern Dry Mixed Deciduous Forest and Moist Shiwalik Sal Forest. Adult individuals of diameter class up to 31-40 cm were observed. Species is very important being one of the ingredients of 'Triphala', an Ayurvedic medicine. Population size of species was meagre in its natural range, hence, suitable strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

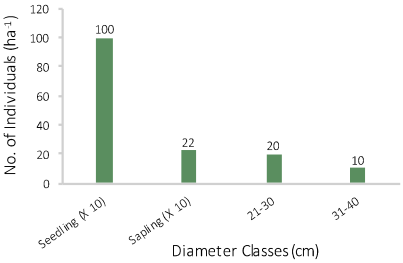
9/C1a Lower or Shiwalik Chir Pine Forest (n=20)



5B/C2 Northern Dry Mixed Deciduous Forest (n=30)

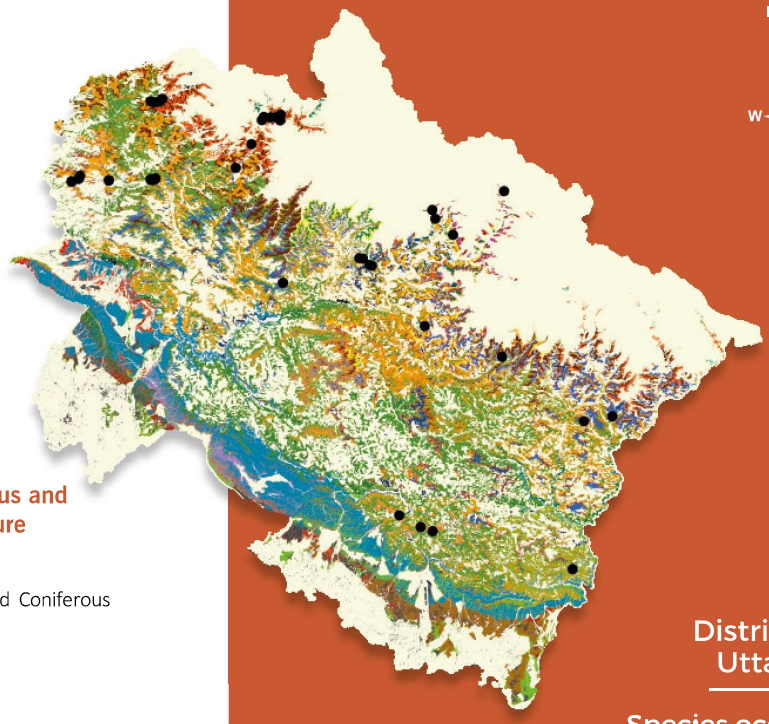


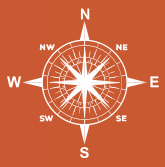
3C/C2a Moist Shiwalik Sal Forest (n=30)



Picea smithiana

(Wall.) Boiss.





Distribution in Uttarakhand

Species occurs up to 2,500-3,300 m.

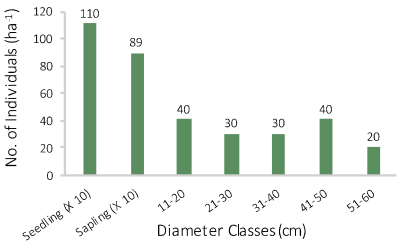
Occurrence in Forest Types
12/C1b, 12/C1c, 12/C1d, 12/C1/DS2, 12/ C2a, 12/C2b, 12/C2c, 12/1S1, and 14/C1b

Forest Divisions
Uttarkashi, Badrinath, Rudraprayag, Pithoragarh, Upper Yamuna, Bageshwar, Nanda Devi National Parkand Chakrata.

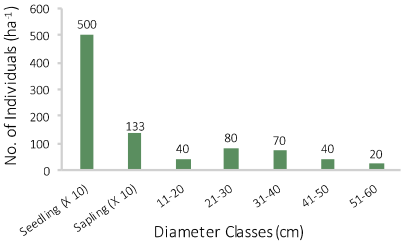
The species exhibited 'good' regeneration in its natural distribution range. Seedling density values observed were 5,000 ha^{-1} and 1,100 ha^{-1} in West Himalayan Sub-alpine Birch/Fir Forest and Western Mixed Coniferous Forest, respectively. Similar trend was observed in sapling stage with density value of 1,330 ha^{-1} in West Himalayan Sub-alpine Birch/Fir Forest and 890 ha^{-1} in Western Mixed Coniferous Forest. Adult tree density value was 250 ha^{-1} in West Himalayan Sub-alpine Birch/ Fir Forest and 160 ha^{-1} for Western Mixed Coniferous Forest. Higher number of adult individuals were recorded up to 41-50 cm diameter class. Species is very important timber species of temperate region, therefore, wild population of species needs to be conserved. Suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

12/C1d Western Mixed Coniferous Forest (n=160)



14/C1b West Himalayan Sub-alpine Birch Fir Forest (n=250)



Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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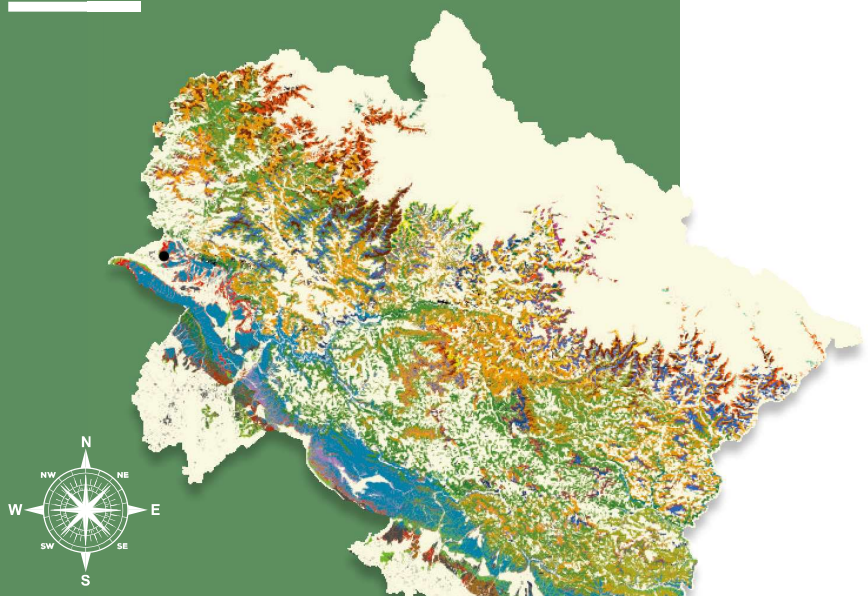
Uttarakhand State

Piliostigma malabaricum

(Roxb.) Benth.



Distribution in Uttarakhand

Species occurs in the Bhabar and Outer most Shiwalik Ranges between 300-600 m.

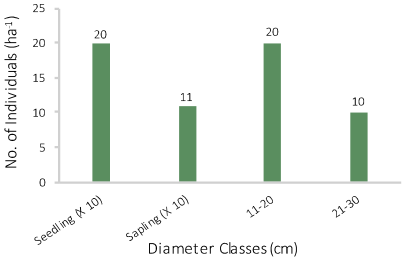
Occurrence in Forest Types
3C/C2c

Forest Divisions
East Terai and Kalsi Soil Conservation.

The species exhibited 'good' regeneration. Values of seedling and sapling density recorded were 200 ha^{-1} and 110 ha^{-1}, respectively. Adult tree density estimated was 30 ha^{-1}. Population was scantly distributed in its natural range, hence, suitable management strategies are required to be adopted for its conservation and improvement.

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=30)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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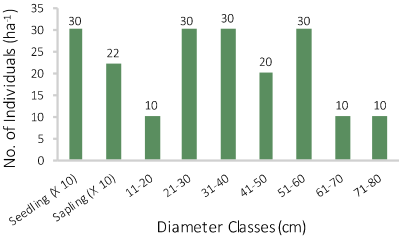
Pilot Project

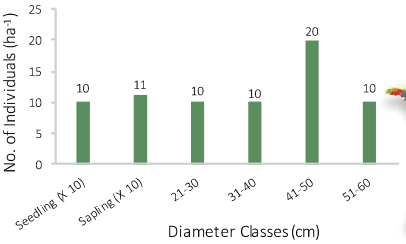
Pinus roxburghii Sarg.

Regeneration Status and Population Structure

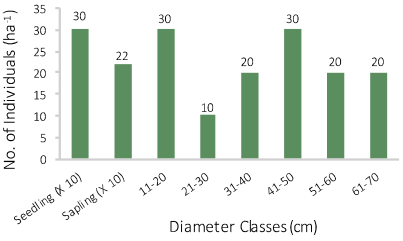
12/2S1 Low- level Blue Pine Forest (n=180)



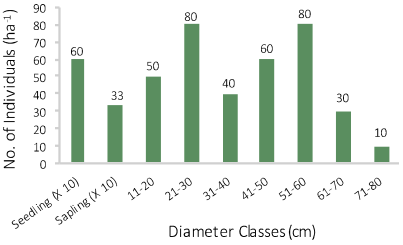
5B/C2 Northern Dry Mixed Deciduous Forest (n=50)



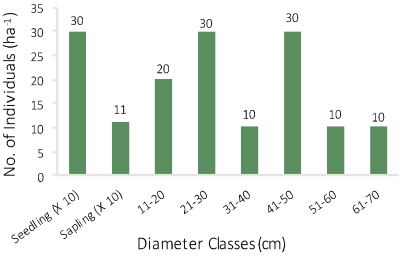
9/C1b Upper or Himalayan Chir Pine Forest (n=130)

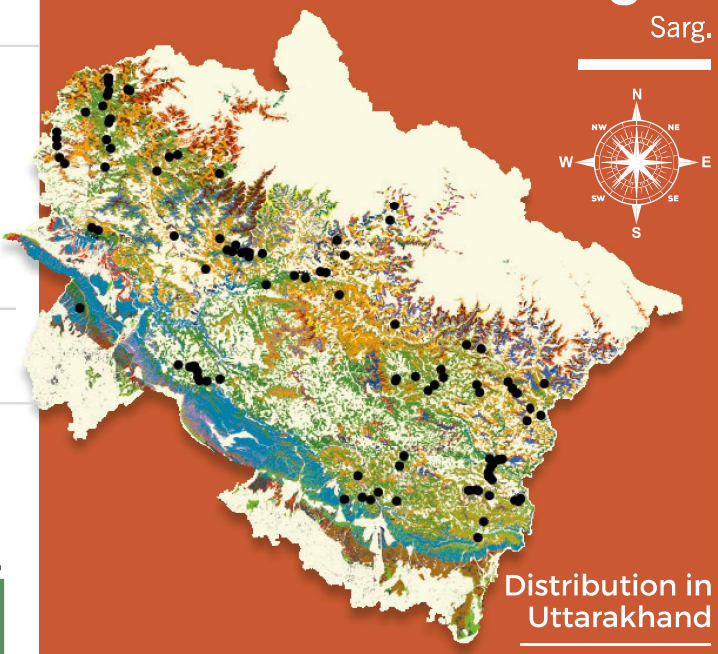


9/C1a Lower or Shiwalik Chir Pine Forest (n=350)



12/C1a Ban Oak Forest (n=110)





Distribution in Uttarakhand

Species occurs throughout the hills between 500-2,500 m.

Occurrence in Forest Types

3C/C3a, 5B/C2, 5/1S2, 9/C1a, 9/C1b, 9/DS1, 9/DS2, 12/C1a, 12/C1b, 12/C1c, 12/C2b, and 12/2S1.

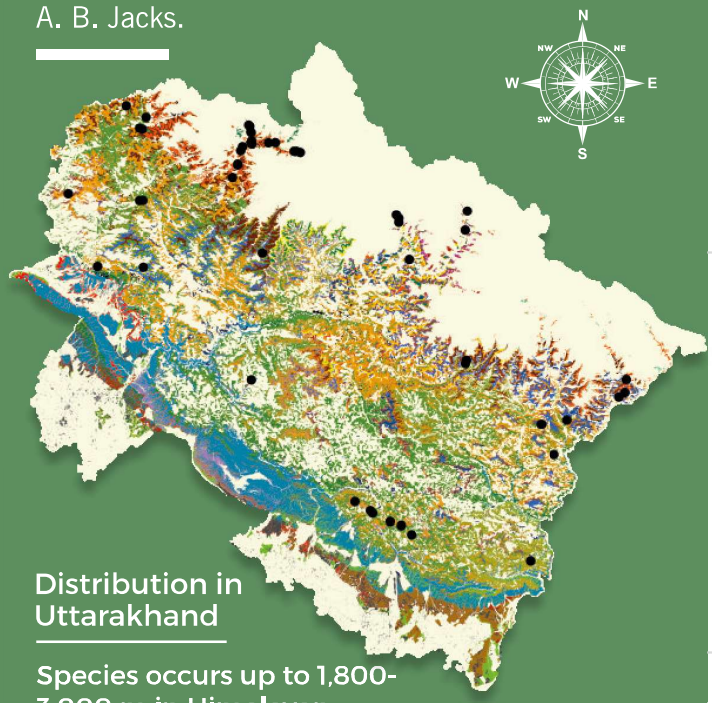
Forest Divisions

Kalsi Soil Conservation, Dehra Dun, Nainital, Champawat, Tons, Uttarkashi, Alknanda, Almora, Pithoragarh, Badrinath, Bageshwar, Chakrata, Tehri Dam –I, Tehri, Rudraprayag, Haldwani, Mussoorie and Rajaji Tiger Reserve

Overall regeneration exhibited by the species was 'good' except in Northern Dry Mixed Deciduous Forest where in 'fair' regeneration was observed. However, proportion of different stages showed variation. Highest seedling density value was 600 ha^{-1} in Lower or Shiwalik Chir Pine Forest and lowest value of 100 ha^{-1} was recorded in Northern Dry Mixed Deciduous Forest. In Lower or Shiwalik Chir Pine Forest, highest sapling density of 330 ha^{-1} was recorded and the lowest value of 110 ha^{-1} was in Northern Dry Mixed Deciduous Forest and Ban Oak Forest. Highest total adult tree density recorded was 350 ha^{-1} in Lower or Shiwalik Chir Pine Forest while lowest value of 50 ha^{-1} was obtained in Northern Dry Mixed Deciduous Forest. Highest number of adult individuals were recorded upto 14-50 cm diameter class. Low densities of lower diameter classes in assessed forest types indicated disturbances in the sampled areas. Species is ecologically, socially and economically very important, hence, suitable strategies are required to be developed for its improvement.

Pinus wallichiana

A. B. Jacks.



Distribution in Uttarakhand

Species occurs up to 1,800-3,000 m in Himalayan forest of the Garhwal and Kumaon region.

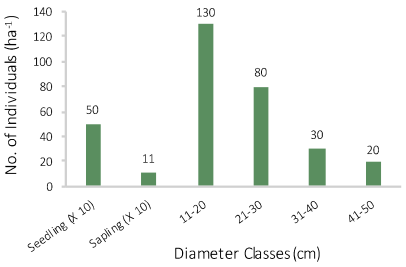
Occurrence in Forest Types
12/C1b, 12/C1c, 12/C1d, 12/C2a, 14/C1a and 14/C1b.

Forest Divisions
Uttarkashi, Chakrata,Pithoragarh, Badrinath, Upper Yamuna,Nanda Devi National Park,Bageshwar, Nainital, Champawat and Mussoorie.

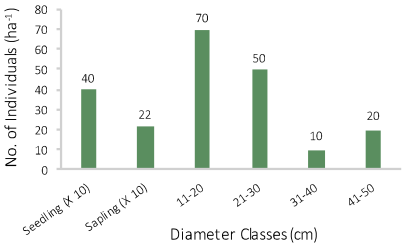
The species depicted 'good' regeneration in West Himalayan Sub-alpine Birch/ Fir Forest and Western Mixed Coniferous Forest while it was 'fair' in Western Himalayan Sub-alpine Fir Forest and Kharsu Oak Forest. Highest seedling density value was 5,300 ha^{-1} in West Himalayan Sub-alpine Birch/Fir Forest and lowest value of 300 ha^{-1} was in West Himalayan Sub-alpine Fir Forest. Establishment rate of sapling was low with highest value of 220 ha^{-1} in West Himalayan Sub-alpine Birch/ Fir Forest and Western Mixed Coniferous Forest. However, highest adult tree density value recorded was 260 ha^{-1} in Kharsu Oak Forest and lowest of 150 ha^{-1} in Western Mixed Coniferous Forest. Wild gene pool of species should be conserved for future improvement programme. Hence, suitable strategies are required to be developed for its conservation.

Regeneration Status and Population Structure

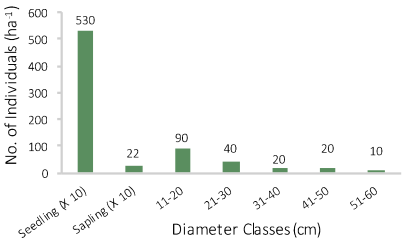
12/C2a Kharsu Oak Forest (n=260)



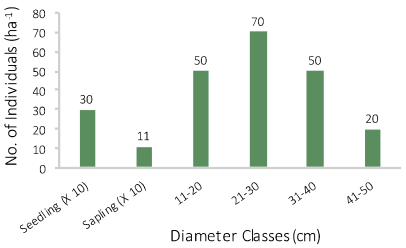
12/C1d Western Mixed Coniferous Forest (n=150)



14/C1b West Himalayan Sub-Alpine Birch/Fir Forest (n=180)



14/C1a West Himalayan Sub-Alpine Fir Forest (n=190)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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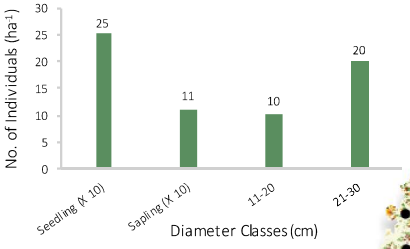
Pilot Project

Pistacia chinensis

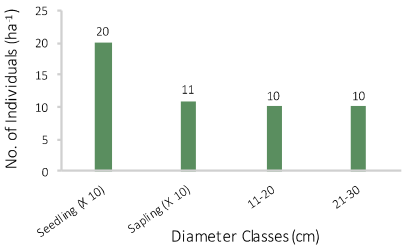
Bunge, Sub sp. *integerrima* (J. L. Stewart) Reich. f

Regeneration Status and Population Structure

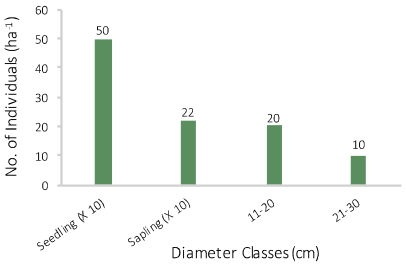
9/C1b Upper or Himalayan Chir Pine Forest (n=30)



5B/C2 Northern Dry Mixed Deciduous Forest (n=20)



12/C1a Ban Oak Forest (n=30)



Distribution in Uttarakhand

Species occurs up to 900-1,800 m.

Occurrence in Forest Types
3C/C3a, 5B/C2, 9/C1b, and 12/C1a

Forest Divisions
Champawat, Chakrata, Tons, Tehri, Uttarkashi, Bageshwar, Nainital, Mussoorie, Rudraprayag, Badrinath, Tehri Dam –I and Lansdowne.

The species exhibited 'good' regeneration in its natural range. Highest seedling density estimated was 500 ha^{-1}, 250 ha^{-1} and 200 ha^{-1} in Ban Oak Forest, Upper or Himalayan Chir Pine Forest and Northern Dry Deciduous Mixed Deciduous Forest, respectively. Sapling density recorded was 220 ha^{-1} for Ban Oak Forest and 110 ha^{-1} in Upper Himalaya Chir Pine Forest and Northern Dry Mixed Deciduous Forest. Overall low adult tree density was observed. Species is economically very important, therefore, wild populations are required to be conserved for future improvement programme. Adult tree population was meagre, hence, suitable strategies are required to be developed for conservation and improvement of the species.

Conservation of Forest Genetic Resources

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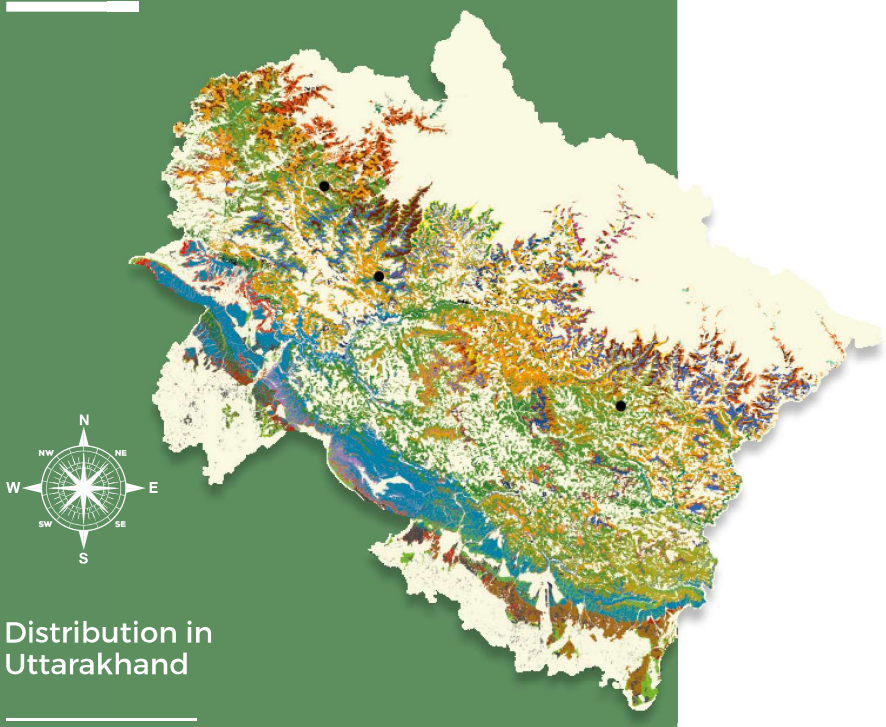
Uttarakhand State

Pittosporum napaulensis

(DC.) Rehder & E. H. Wilson



Distribution in Uttarakhand

Species occurs up to 1,300 m.

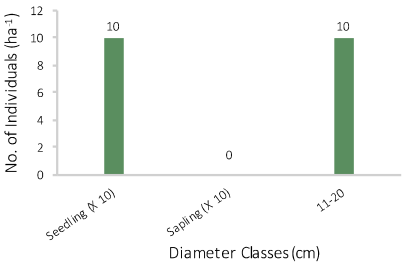
Occurrence in Forest Types
12/C1a

Forest Divisions
Bageshwar, Uttarkashi and Tehri Dam –I

Observed regeneration of the species was 'fair'. Seedling density value observed was 100 ha^{-1}. Population was completely devoid of sapling stage. Adult tree population was extremely low with density value of just 10 ha^{-1}. Population of species was critically low, therefore, suitable management strategies are required to be developed for its conservation.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=10)



Conservation of Forest Genetic Resources

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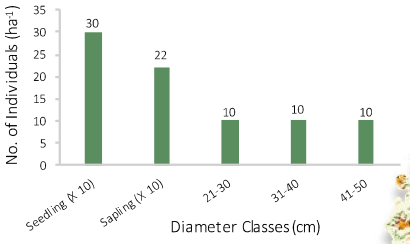
Pilot Project

Populus ciliata

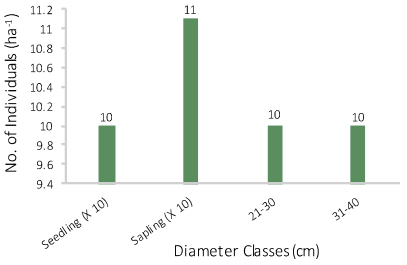
Wall. ex Royle

Regeneration Status and Population Structure

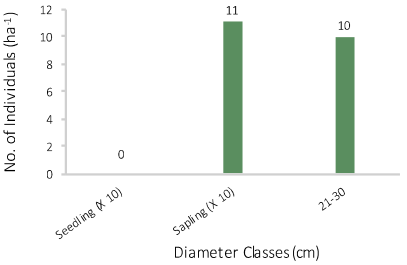
9/C1b Upper or Himalayan Chir Pine Forest (n=30)

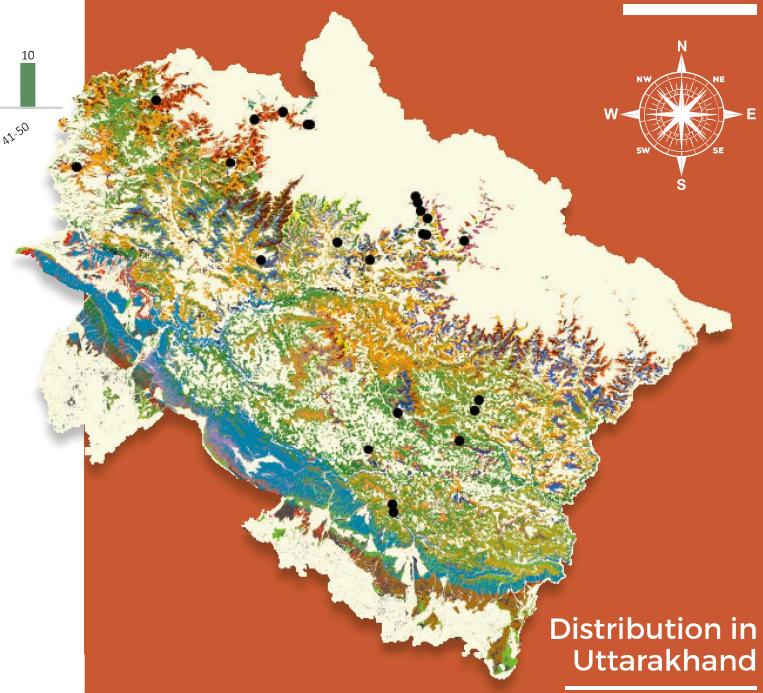


12/1S1 Alder Forest (n=20)



12/C1a Ban Oak Forest (n=10)





Distribution in Uttarakhand

Species occurs throughout the up to 2,000-2,700 m.

Occurrence in Forest Types

9/C1b, 9/DS2, 12/C1a, 12/C1b, 12/C1c, 12/C1d, 12/1S1 and 14/C1b.

Forest Divisions

Uttarkashi, Almora, Nainital, Chakrata, Bageshwar, Nanda Devi National Park, Badrinath, Pithoragarh, Mussoorie, Rudraprayag and Kedarnath Wildlife Sanctuary

The species depicted 'good' regeneration in Upper or Himalayan Chir Pine Forest while 'fair' regeneration in Alder Forest. Ban Oak Forest was devoid of seedling stage. Highest seedling density value recorded was 300 ha^{-1} in Upper or Himalayan Chir Pine Forest and 100 ha^{-1} in Alder Forest. Highest sapling density of 220 ha^{-1} was recorded in Upper Himalayan Chir Pine Forest, and 110 ha^{-1} in Alder Forest and Ban Oak Forest. Highest adult tree density value observed was 30 ha^{-1} in Upper Himalayan Chir Pine Forest while lowest value of was 10 ha^{-1} was in Ban Oak Forest. Overall adult tree population was observed very low. Species may be key of future improvement programme of presently important 'Populus' group. Hence, suitable strategies are required to develop for its conservation and improvement.

Conservation of Forest Genetic Resources

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Uttarakhand State

Premna mollissima

Roth.

Distribution in Uttarakhand

Species occurs throughout the area up to 900 m.

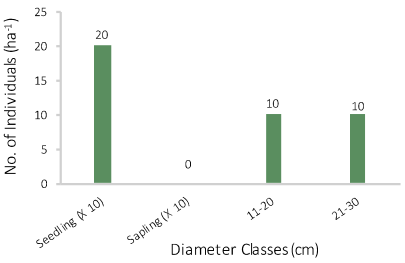
Occurrence in Forest Types
3C/C2a, 3C/C2c, 5B/C1a, 5B/C1b and 9/C1b.

Forest Divisions
Terai East, Mussoorie, Dehra Dun, Pithoragarh, Ramnagar and Rudraprayag.

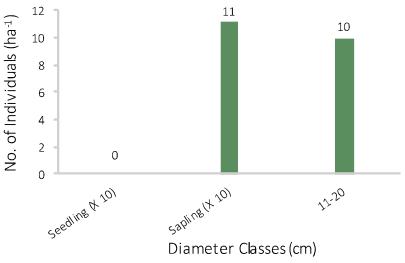
The species exhibited 'poor' regeneration in Moist Terai Sal Forest as well as in Northern Dry Mixed Deciduous Forest while 'fair' regeneration was observed in Moist Shiwalik Sal Forest. Highest seedling density observed was 200 ha^{-1} in Moist Shiwalik Sal Forest. Sapling density of 110 ha^{-1} was recorded in Moist Terai Sal Forest, Dry Shiwalik Sal Forest and Northern Dry Mixed Deciduous Forest. Adult tree density value recorded was 20 ha^{-1} in Moist Shiwalik Sal Forest while there were only 10 individual's ha^{-1} in all other assessed forest types. Species is very important being one of ingredients of 'Dashmularisht', an Ayurvedic medicine. Overall population was very low, hence, suitable strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

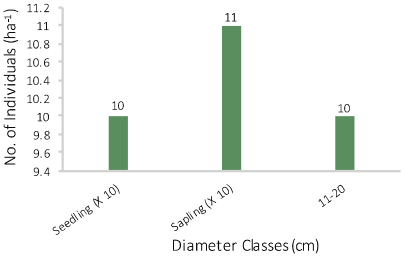
3C/C2a Moist Shiwalik Sal Forest (n=20)



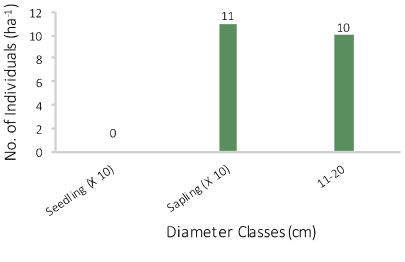
3C/C2c Moist Terai Sal Forest (n=10)



5B/C1a Dry Shiwalik Sal Forest (n=10)



5B/C2 Northern Dry Mixed Deciduous Forest (n=10)



Conservation of Forest Genetic Resources

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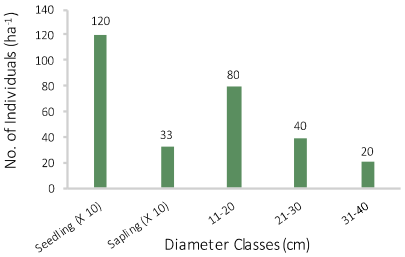
Uttarakhand State

Prunus cerasoides

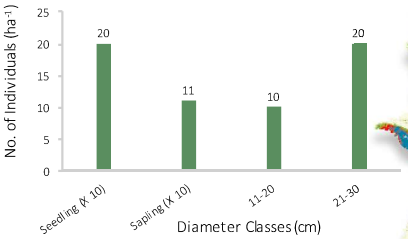
Buch. Ham. ex D. Don

Regeneration Status and Population Structure

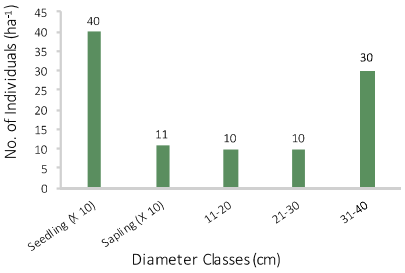
12/C1a Ban Oak Forest (n=140)



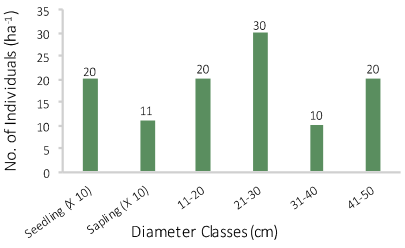
14/C1b West Himalayan Sub-alpine Birch/Fir Forest (n=30)



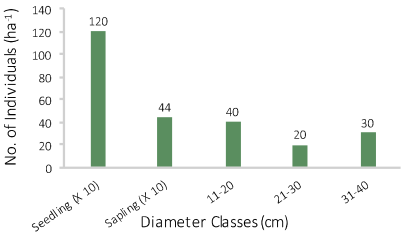
12/C1b Moru Oak Forest (n=50)

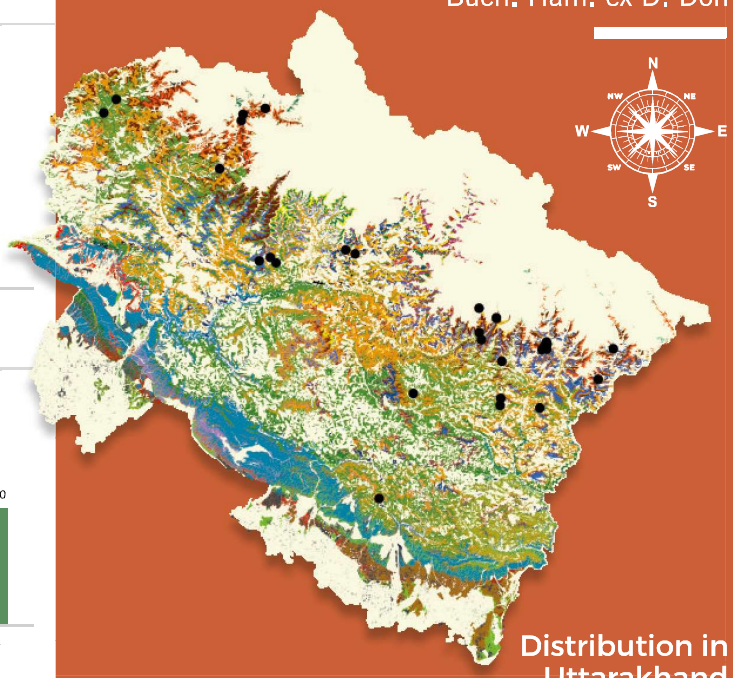


9/C1b Upper or Himalayan Chir Pine Forest (n=80)



14/1S2 Deciduous Sub-alpine Scrub (n=90)





Distribution in Uttarakhand

Species occurs throughout the hills between 600 – 2,100 m and it is fairly common on the outer hills ranges.

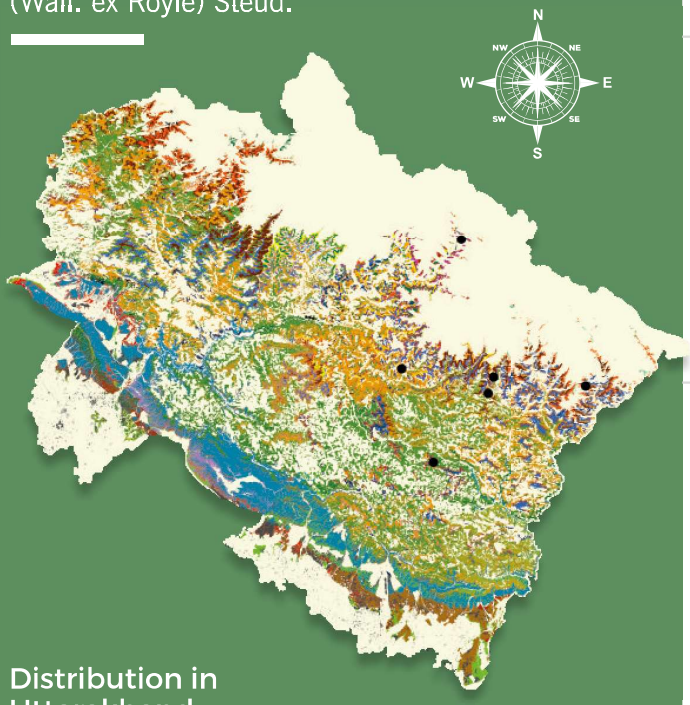
Occurrence in Forest Types
9/C1b, 12/C1a, 12/C1b, 12/C1c,12/C2b, 12/C1e, 14/C1b and 14/1S2

Forest Divisions
Pithoragarh, Uttarkashi, Nainital, Tehri Dam–I, Rudraprayag and Bageshwar

The species exhibited overall 'good' regeneration in its natural range. However, proportion of seedlings, saplings and adult trees showed variation. Highest seedling density recorded was 1,200 ha^{-1} in Deciduous Sub-alpine Scrub and Ban Oak Forest. Highest sapling density value observed was 440 ha^{-1} in Deciduous Sub-alpine Scrub. Highest total adult tree density recorded was 140 ha^{-1} in Ban Oak Forest while the lowest value of 30 ha^{-1} was recorded in West Himalayan Sub-alpine Birch/Fir Forest. Wild gene pool of the species needs to be conserved for future. Suitable strategies are required for its conservation.

Prunus cornuta

(Wall. ex Royle) Steud.



Distribution in Uttarakhand

Species occurs up to 1,800-2,700 m but scarce in outer ranges.

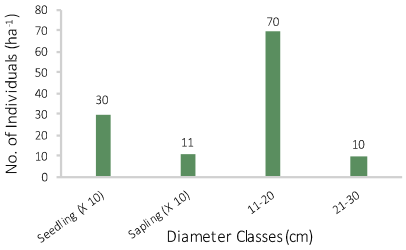
Occurrence in Forest Types
12/C1a, 12/C1b, 12/C1c, 12/C1/DS1, 12/C2b, and 14/1S2

Forest Divisions
Bageshwar, Badrinath and Pithoragarh

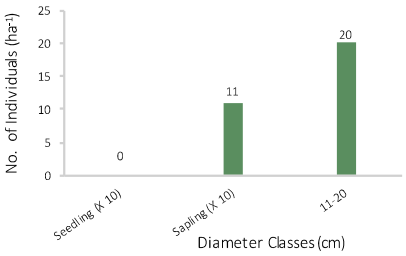
The species exhibited 'good' regeneration in Moist Deodar Forest, West Himalaya Upper Oak /Fir Forest and Moru Oak Forest while it was 'fair' in Deciduous Sub-alpine Scrub, and 'poor' in Ban Oak Forest. Highest seedling density observed was 300 ha^{-1} in Moist Deodar Forest. Sapling density value observed was 110 ha^{-1} in most of the assessed forest types, except in Deciduous Sub-alpine Scrub where no sapling was observed. Highest adult tree density value recorded was 80 ha^{-1} in Moist Deodar Forest while the lowest value of 20 ha^{-1} was recorded in Ban Oak Forest and Subalpine Forest. Overall adult tree density was low. Hence, suitable strategies are required for the species conservation.

Regeneration Status and Population Structure

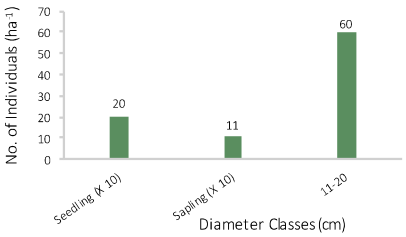
12/C1c Moist Deodar Forest (n=80)



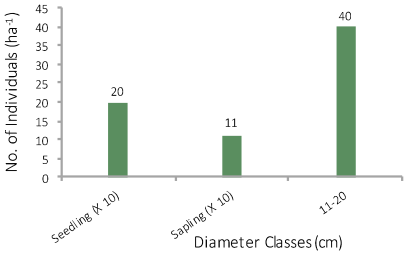
12/C1a Ban Oak Forest (n=20)



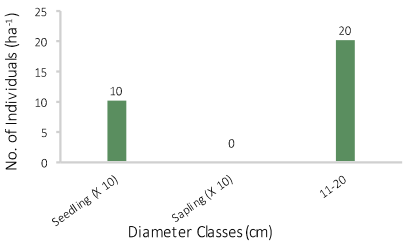
12/C2b West Himalayan Upper Oak/Fir Forest (n=60)



12/C1b Moru Oak Forest (n=40)



14/1S2 Deciduous Sub-alpine Scrub (n=20)



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Pilot Project

Pterospermum acerifolium

(Linn.) Willd.

Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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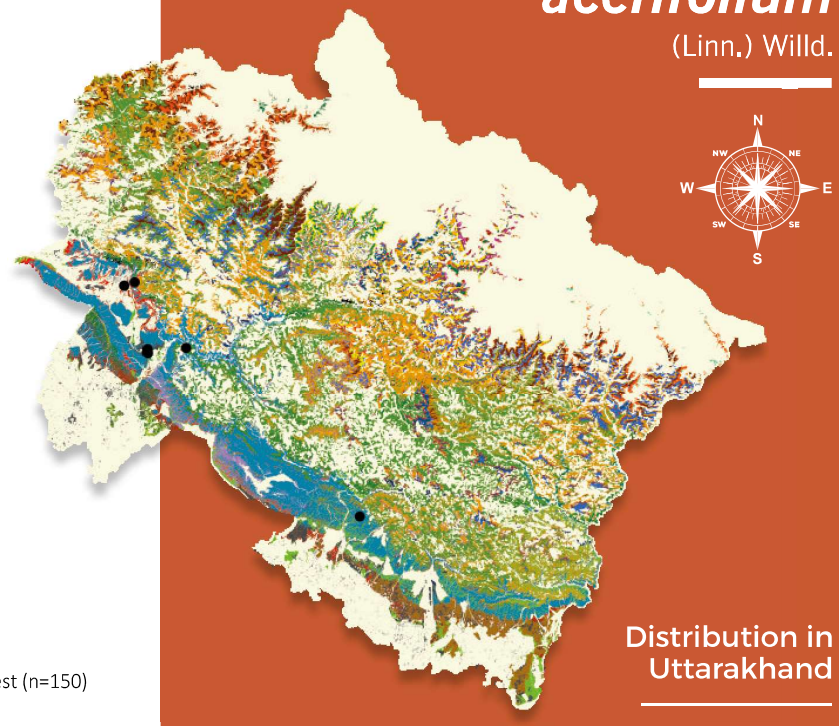
Uttarakhand State



Distribution in Uttarakhand

Species is very common in the swampy forests of the eastern Dehra Dun about Khairi and Sidhaerwala but frequently cultivated in Dehra Dun.

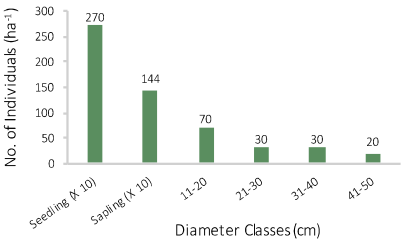
Occurrence in Forest Types
3C/C2a, 5B/C1a and 12/C1c

Forest Divisions
Ramnagar, Mussoorie, Lansdowne and Dehra Dun.

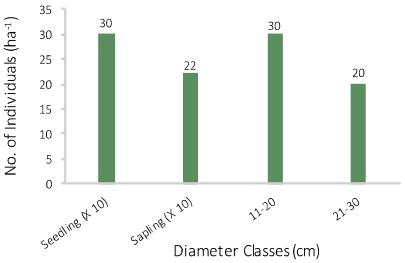
Overall regeneration status of the species was 'good' in its natural range. Seedling density value observed was 2,700 ha^{-1} in Moist Shiwalik Sal Forest and 300 ha^{-1} in Dry Shiwalik Sal Forest. Similar trend was observed for sapling stage where in density of 1,440 ha^{-1} was recorded in Moist Shiwalik Forest and 220 ha^{-1} in Dry Shiwalik Sal Forest. Total adult tree density value observed was 150 ha^{-1} in Moist Shiwalik Sal Forest while it was 50 ha^{-1} in Dry Shiwalik Sal Forest. Overall population size was meagre. Suitable strategies are required for the species conservation.

Regeneration Status and Population Structure

3C/C2a Moist Shiwalik Sal Forest (n=150)

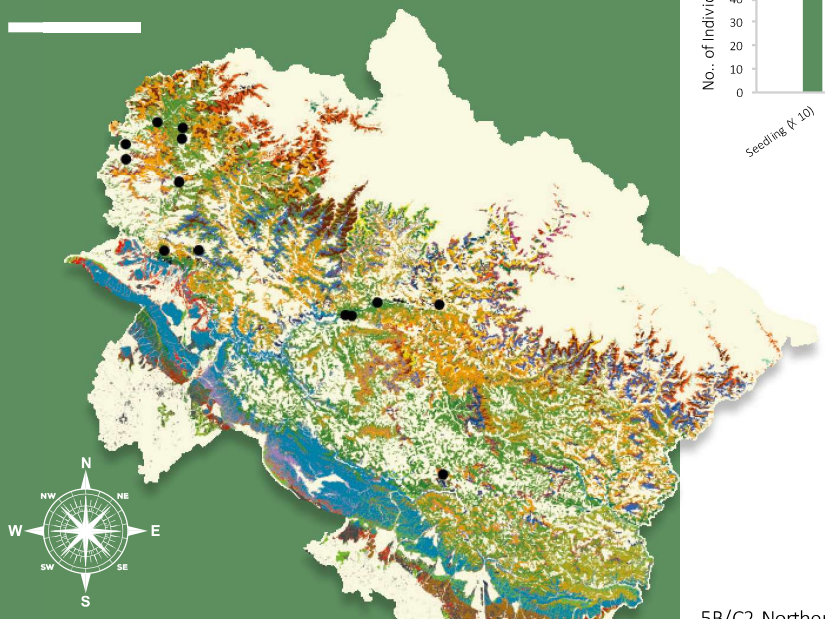


5B/C1a Dry Shiwalik Sal Forest (n=50)



Punica granatum

L.



Distribution in Uttarakhand

Species found wild in valleys of Jaunsar and Tehri Garhwal below 1,800 m.

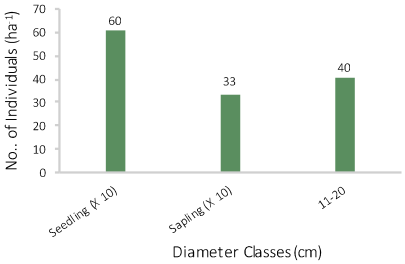
Occurrence in Forest Types
5B/C2, 5/IS2, 9/C1b, 12/C1a and 12/C2c.

Forest Divisions
Upper Yamuna, Tehri, Rudraprayag, Badrinath, Tons, Mussoorie, Chakrata and Almora.

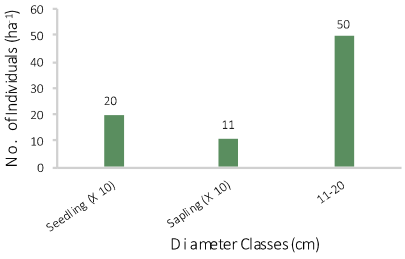
The species exhibited 'good' regeneration in Ban Oak Forest and Northern Dry Mixed Deciduous Forest while it was just 'fair' regeneration in Upper or Himalayan Chir Pine Forest. Highest seedling density of 600 ha^{-1} in Ban Oak Forest was observed, followed by 200 ha^{-1} in Northern Dry Mixed Deciduous Forest and 100 ha^{-1} in Upper or Himalayan Chir Pine Forest. Highest sapling density value of 330 ha^{-1} was also recorded in Ban Oak Forest. Total adult tree density values recorded were: 50 ha^{-1}, 40 ha^{-1} and 30 ha^{-1} in Northern Dry Mixed Deciduous Forest, Ban Oak Forest and Upper or Himalayan Chir Pine Forest, respectively. Overall adult population was low. Suitable strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

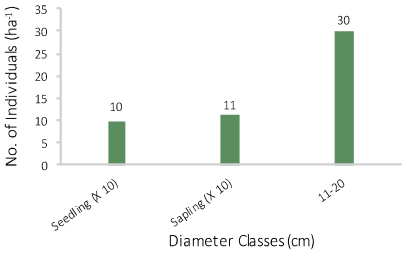
12/C1a Ban Oak Forest (n=40)



5B/C2 Northern Dry Mixed Deciduous Forest (n=50)



9/C1b Upper or Himalayan Chir Pine Forest (n=30)



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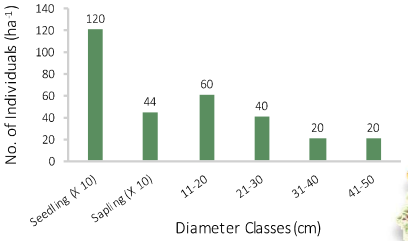
Pilot Project

Putranjiva roxburghii

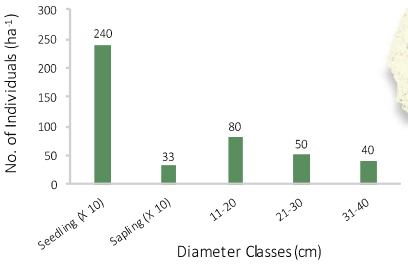
Wall.

Regeneration Status and Population Structure

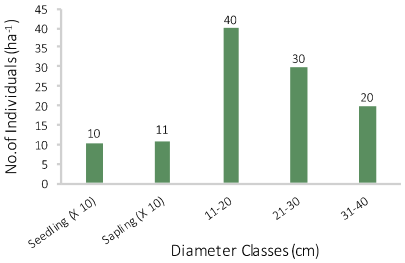
3C/C2a Moist Shiwalik Sal Forest (n=140)



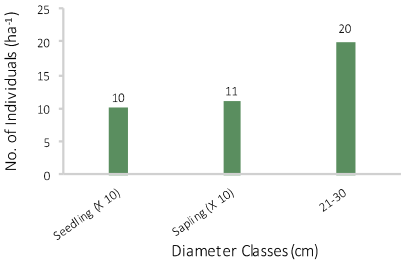
3C/C2c Moist Terai Sal Forest (n=170)

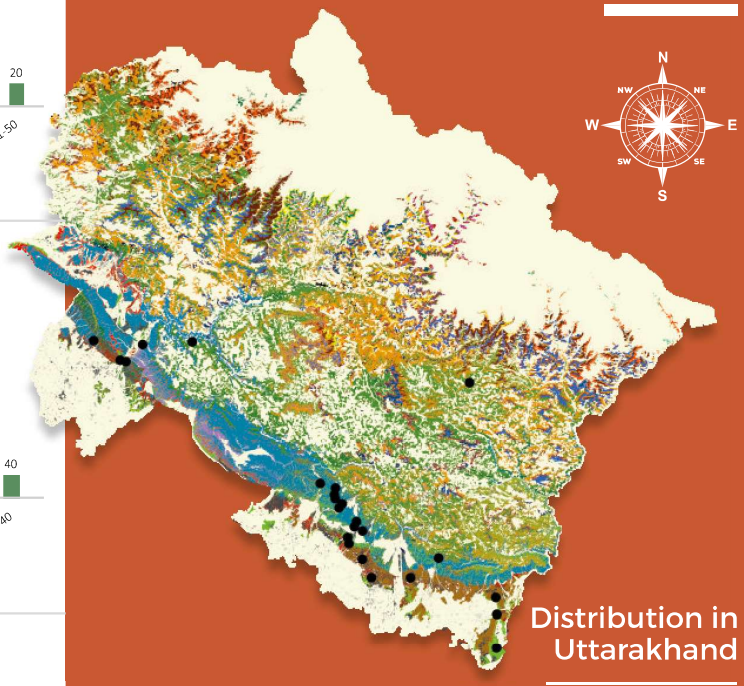


5B/C1b Dry Plain Sal Forest (n=90)



12/C1a Ban Oak Forest (n=20)





Distribution in Uttarakhand

Species occurs in the Bhabar and Sub-Himalayan tracts up to 400 m and it is rarely found in moist and shady localities.

Occurrence in Forest Types
Plantation, 3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C1b, 5B/C2, 5/1S2, 9/C1b and 12/C1a.

Forest Divisions
Terai East, Ramnagar, Bageshwar, Terai Central and Dehra Dun.

The species exhibited 'good' regeneration in Moist Shiwalik Sal Forest and Moist Terai Sal Forest while 'fair' regeneration was recorded in Ban Oak Forest and Dry Plain Sal Forest. Highest seedling density value observed was 2,400 ha^{-1} in Moist Terai Sal Forest, followed by 1,200 ha^{-1} in Moist Shiwalik Sal Forest and 100 ha^{-1} in Ban Oak Forest and Dry Plain Sal Forest. However, highest sapling density estimated was 440 ha^{-1} in Moist Shiwalik Sal Forest which indicated better establishment from seedling to saplings. Highest adult tree density was 170 ha^{-1} in Moist Terai Sal Forest and the lowest of 20 ha^{-1} was in Ban Oak Forest. Wild gene pool of species needs to conserve. Suitable strategies are required for its conservation and improvement.

Conservation of Forest Genetic Resources

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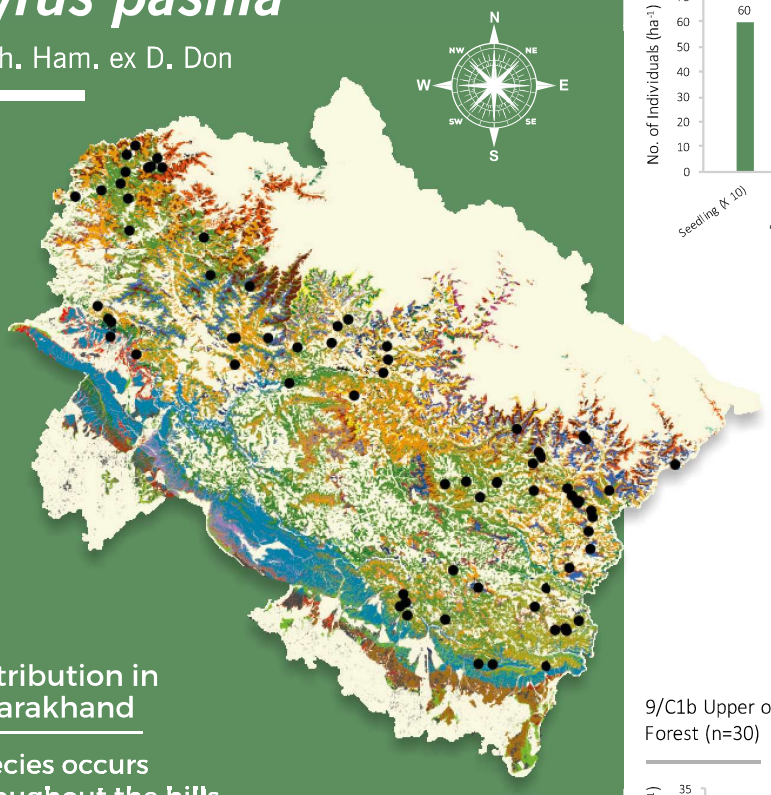
Uttarakhand State

Pyrus pashia

Buch. Ham. ex D. Don



Distribution in Uttarakhand

Species occurs throughout the hills between 700-2,400 m.

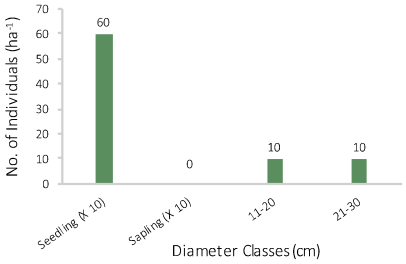
Occurrence in Forest Types
3C/C2a, 3C/C2c, 9/C1a, 9/C1b, 9/DS1, 12/C1a, 12/C1b, 12C1c, 12/C1d, 12/C2b and 12/1S1.

Forest Divisions
Chakrata, Pithoragarh, Nainital, Uttarkashi, Bageshwar, Mussoorie, Tehri, Rudraprayag, Badrinath, Tehri Dam-I, Alaknanda Soil Conservation and Kedarnath Wildlife Sanctuary

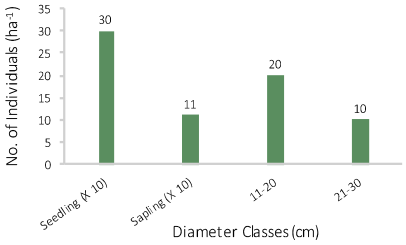
The species exhibited 'good' regeneration in Ban Oak Forest and Himalayan Chir Pine Forest while 'fair' regeneration was observed in Moist Shiwalik Sal Forest. Highest seedling density value recorded was 600 ha^{-1} in Moist Shiwalik Sal Forest while the lowest value of 300 ha^{-1} was in Himalayan Chir Pine Forest. Sapling density of 330 ha^{-1} was recorded for Ban Oak Forest and 110 ha^{-1} was for Himalaya Chir Pine Forest. In Moist Shiwalik Sal Forest, no sapling stage was observed. Adult tree density of 30 ha^{-1} was recorded in Ban Oak Forest and Upper or Himalayan Chir Pine Forest while it was 20 ha^{-1} in Moist Shiwalik Sal Forest. Overall adult tree density was low. Hence, suitable strategies are required to be developed for its conservation and improvement.

Regeneration Status and Population Structure

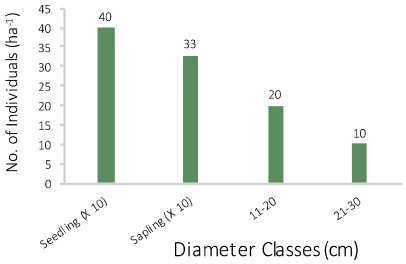
3C/C2a Moist Shiwalik Sal Forest (n=20)



9/C1b Upper or Himalayan Chir Pine Forest (n=30)



12/C1a Ban Oak Forest (n=30)



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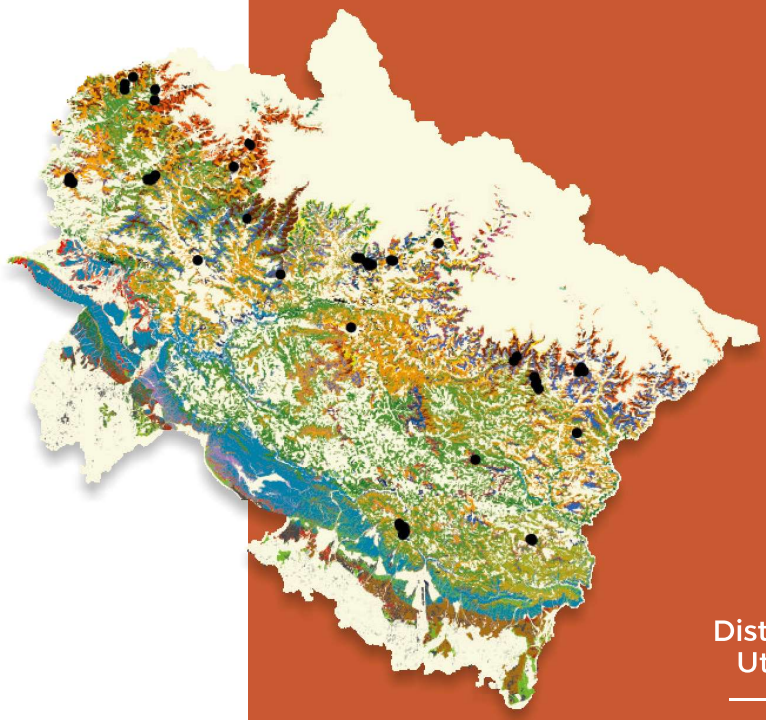
Uttarakhand State

Quercus floribunda

Lindl. ex A. Camus



Distribution in Uttarakhand

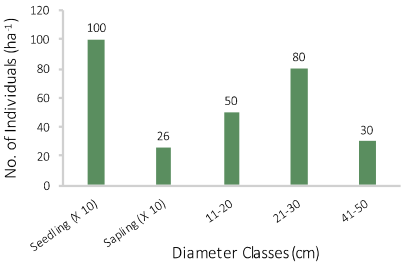
Species common in Jaunsar and Tehri Garhwal up to 1,900-2,700 m.

Occurrence in Forest Types
9/C1b, 9/DS2, 12/C1a, 12/C1b, 12/C1c, 12/C1e, 12/C2c, 14/C1a, 14/C1b and 14/1S2.

Forest Divisions
Champawat, Uttarkashi, Bageshwar, Nainital, Chakrata, Kedarnath, Rudraprayag, Govind Pashu Vihar, Upper Yamuna, Chamoli, Tehri, Narendranagar, and Pithoragarh.

Regeneration Status and Population Structure

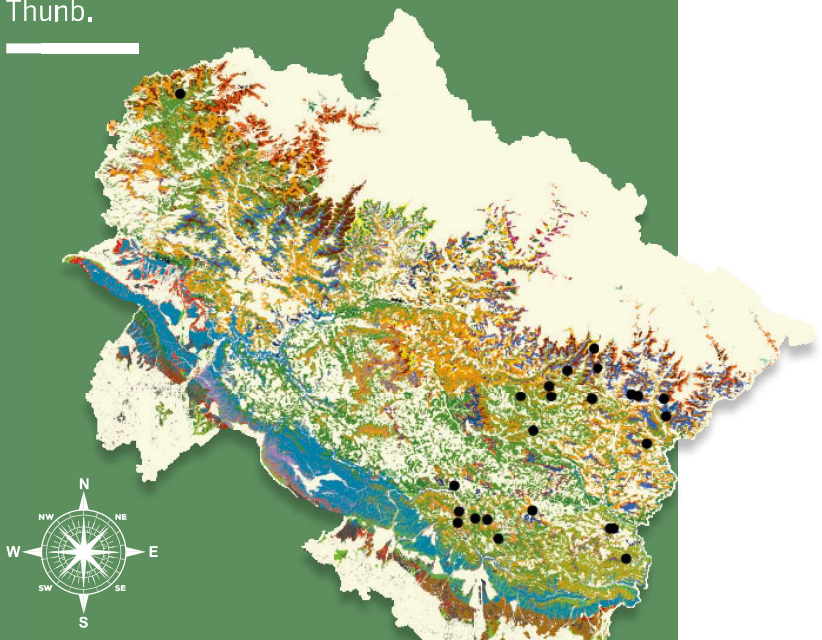
12/C1b Moru Oak Forest (n=160)



The species depicted 'good' regeneration. Values of seedling and sapling density recorded were: 1,000 ha^{-1} and 260 ha^{-1}, respectively. Adult trees density value was 160 ha^{-1}. Highest density value of 80 ha^{-1} was recorded in lower diameter class of 21-30 cm. Population of species was low in its natural range. Hence, suitable strategies are required to be developed for its conservation and improvement.

Quercus glauca

Thunb.



Distribution in Uttarakhand

Species found in shady valleys of Jaunsar and Tehri Garhwal up to 910-1,500 m.

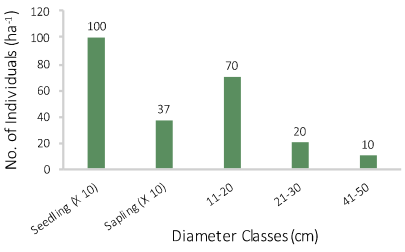
Occurrence in Forest Types
9/C1b

Forest Divisions
Bageshwar, Pithoragarh and Champawat.

The species exhibited 'good' regeneration. Seedlings and saplings density values estimated were 1,000 ha^{-1} and 370 ha^{-1}. Total adult density value observed was 100 ha^{-1}. Highest density recorded was 70 ha^{-1} in diameter class of 51-60 cm. Species is scantly distributed in temperate region. Therefore, appropriate strategies are required for its conservation and improvement.

Regeneration Status and Population Structure

9/C1b Upper or Himalayan Chir Pine Forest (n=100)



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Uttarakhand State

Quercus lanata

Sm

Distribution in Uttarakhand

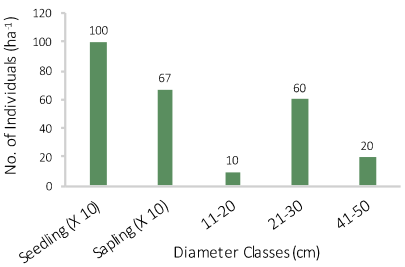
Species found throughout the hills up to 1,800 and 2,400 m.

Occurrence in Forest Types
12/C1a, 12/C1b, and 14/C1b.

Forest Divisions
Champawat, Uttarkashi, Bageshwar, Pithoragarh, Nainital, Mussoorie, Kedarnath and Almora.

Regeneration Status and Population Structure

12/C1a Ban Oak Forest (n=90)



The species exhibited 'good' regeneration. Values of seedling and sapling densities estimated were: 1,000 ha^{-1} and 670 ha^{-1}, respectively. Total adult trees density value of 90 ha^{-1} was recorded, out of which 40 ha^{-1} was from the 21-30 cm diameter class. Only 10 individuals ha^{-1} in 11-20 cm diameter class were recorded indicate disturbances. Suitable management strategies are required to be adopted for its conservation.

Quercus leucotrichophora

A. Camus

Distribution in Uttarakhand

Species found up to 1,800-3,000 m in Himalayan forest in Garhwal and Kumaon region.

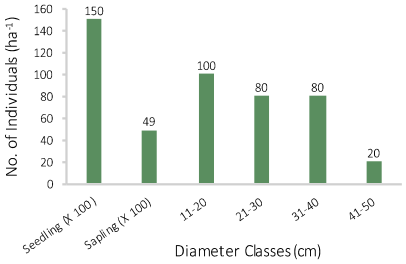
Occurrence in Forest Types
9/C1a, 9/C1b, 9/DS2, 12/C1a, 12/C1b, 12/C1c, 12/C1d, 12/C1f, 12/C1/DS1, 12/C1/DS2, 12/C2b and 12/1S1.

Forest Divisions
Terai East, Ramnagar, Terai West, Champawat, Terai Central, Nainital, Haridwar, Lansdowne and Haldwani.

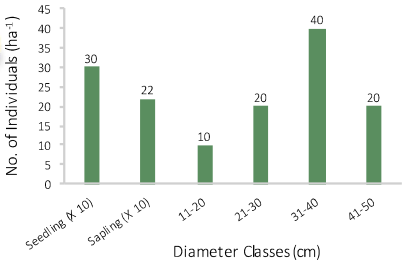
Overall 'good' regeneration was exhibited by the species. Highest seedling density value of 1,500 ha^{-1} was recorded in Ban Oak Forest while the lowest value of 300 ha^{-1} was in Moist Deodar Forest. Highest sapling density of 670 ha^{-1} was recorded in Moist Temperate Deciduous Forest while the lowest sapling density of 220 ha^{-1} was in Moist Deodar Forest. Highest adult trees density value recorded was 280 ha^{-1} in Ban Oak Forest and the lowest value of 70 ha^{-1} was in Moist Temperate Deciduous Forest. In spite of highest density the requirement rate to adults was least in Moist Temperate Deciduous Forest. Wild gene pool of species needs to be conserved. Suitable strategies are required to be developed for species conservation.

Regeneration Status and Population Structure

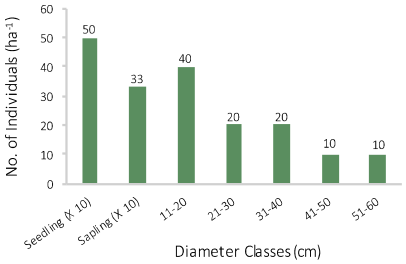
12/C1a Ban Oak Forest (n=280)



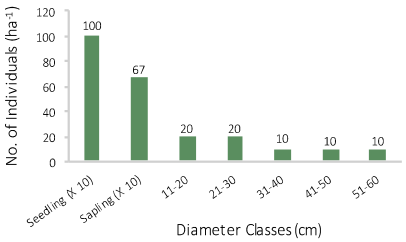
12/C1c Moist Deodar Forest (n=90)



12/C1b Moru Oak Forest (n=100)



12/C1e Moist Temperate Deciduous Forest (n=70)



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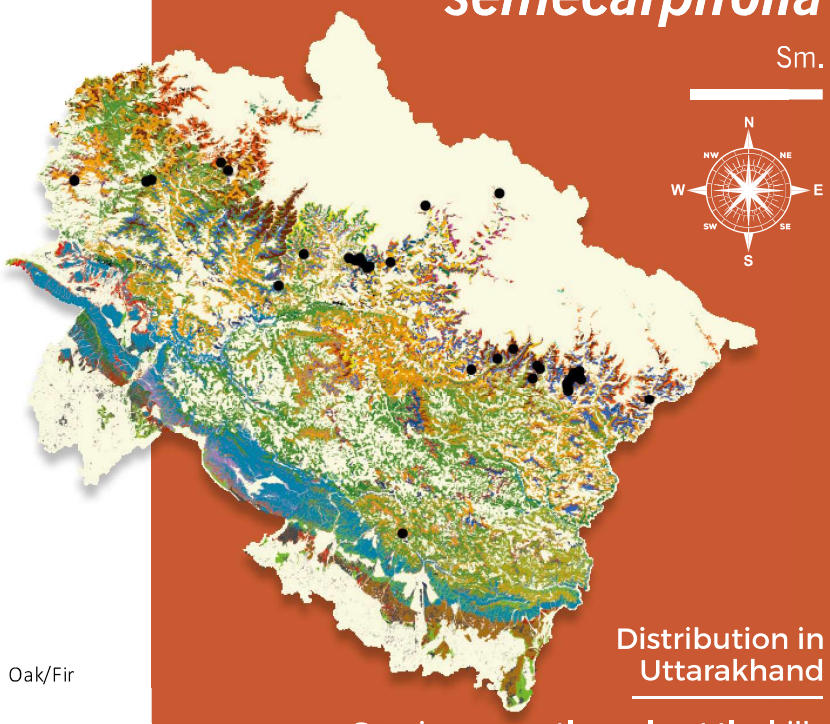
Uttarakhand State

Quercus semecarpifolia

Sm.



Distribution in Uttarakhand

Species occurs throughout the hills between 2,100-3,500 m.

Occurrence in Forest Types

12/C1b,12/C1c, 12/C1d, 12/C1e, 12/C1f, 12/C1/DS2, 12/C2a, 12/C2b, 12/C2c, 13/1S1, 14/C1b and 14/1S2.

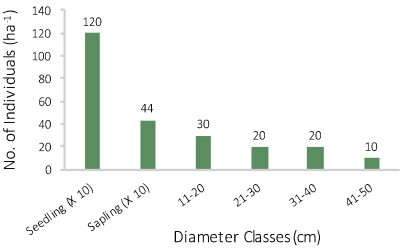
Forest Divisions

Nainital, Kedarnath, Uttarkashi, Rudraprayag, Champawat, Upper Yamuna, Bageshwar, Badrinath, Chakrata and Pithoragarh.

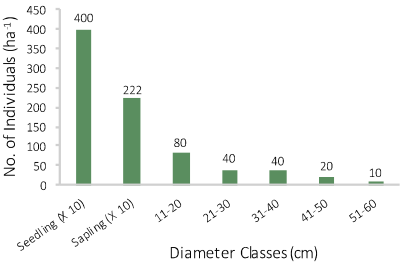
The species exhibited overall 'good' regeneration. However, proportion of seedling, sapling and adult density values showed variation. Seedling density values recorded were 4,000 ha^{-1} and 1,200 ha^{-1} in Kharsu Oak Forest and West Himalayan Upper Oak/Fir Forest, respectively. Similar trend was observed in sapling stages with density stages of 2,220 ha^{-1} in Kharsu Oak Forest and 440 ha^{-1} in West Himalayan Upper Oak/Fir Forest. Total adult tree density value recorded was 190 ha^{-1} in Kharsu Oak Forest while it was 80 ha^{-1} for West Himalayan Upper Oak/ Fir Forest. In Kharsu Oak Forest, higher number of adult tree individuals were recorded from lower diameter classes indicating was evolving. Species is very important and its wild gene pool should be conserved. Suitable management strategies to be adopted for species conservation.

Regeneration Status and Population Structure

12/C2b West Himalayan Upper Oak/Fir Forest (n=80)

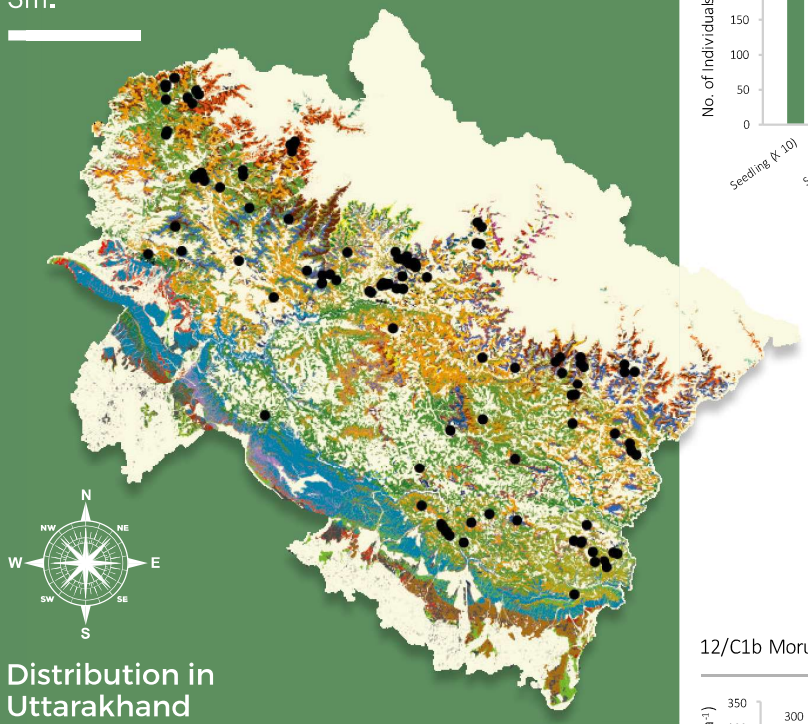


12/C2a Kharsu Oak Forest (n=190)



Rhododendron arboreum

Sm.



Distribution in Uttarakhand

Species found up to 1,800-3,000 m in Himalayan forest in Garhwal and Kumaon region.

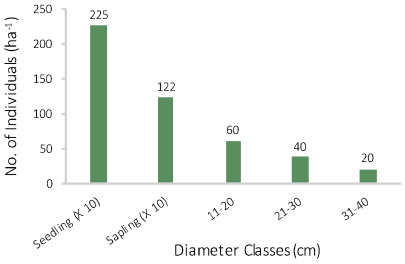
Occurrence in Forest Types
9/C1a, 9/C1b, 9/DS1, 12/C1a, 12/C1b, 12/C1c, 12/C1d, 12/C1e, 12/C1f, 12/C2b, 12/C2c and 14/C1b

Forest Divisions
Champawat, Uttarkashi, Bageshwar, Nainital, Pithoragarh, Kedarnath Wildlife Sanctuary, Rudraprayag, Mussoorie, Upper Yamuna, Tehri, Tons, Narendranagar, Badrinath, Almora and Lansdowne

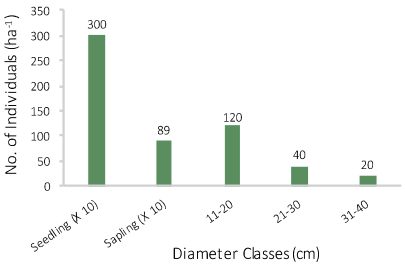
The species exhibited 'good' regeneration in its natural range. Seedling density values estimated were: 3,300 ha^{-1}, 2,250 ha^{-1} and 1,300 ha^{-1} for Moru Oak Forest, Ban Oak Forest and West Himalayan Sub-alpine Birch/Fir Forest, respectively. Highest sapling density value recorded was 1,220 ha^{-1} in Ban Oak Forest. Highest adult tree density of 180 ha^{-1} was estimated for Moru Oak Forest and lowest of 50 ha^{-1} for West Himalayan Sub-alpine Birch/ Fir Forest. This species is economically very important, therefore wild populations are required to conserve for future improvement programme and species conservation.

Regeneration Status and Population Structure

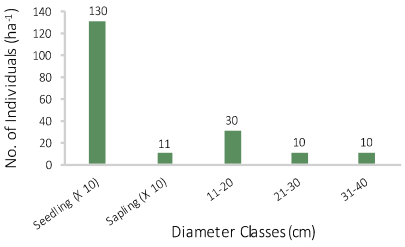
12/C1a Ban Oak Forest (n=120)



12/C1b Moru Oak Forest (n=180)

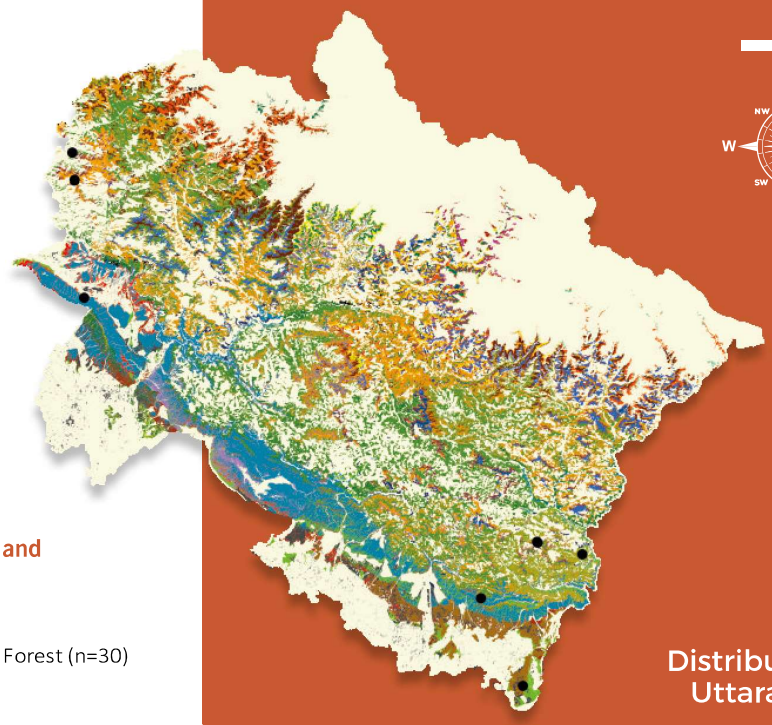


14/C1b West Himalayan Sub-alpine Birch/Fir Forest (n=50)



Salix tetrasperma

Roxb.



Distribution in Uttarakhand

Species occurs throughout the Sub-Himalayan tract and central & outer hill ranges up to 1,100 m.

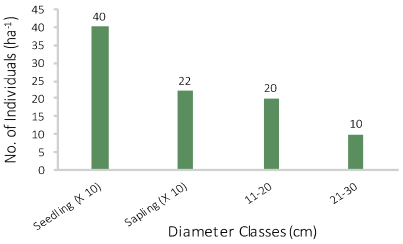
Occurrence in Forest Types
3C/C2a, 3C/C2c, 9/C1a, and 9/C1b.

Forest Divisions
Champawat, Uttarkashi, Dehra Dun, Terai East and Chakrata.

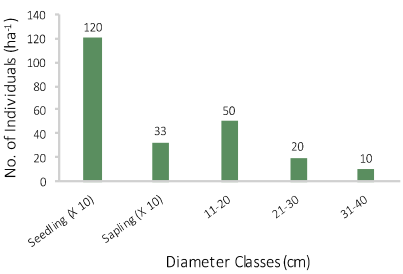
The regeneration status of the species was 'good' in its natural distribution range. However, proportion of different regeneration stages showed variation. Seedling density value observed was 1,200 ha^{-1} and 400 ha^{-1} in Lower or Shiwalik Chir Pine Forest and Moist Terai Sal Forest, respectively. Similar trend was observed in case of saplings and adult trees. Total adult tree density value estimated were 80 ha^{-1} and 30 ha^{-1} for Lower or Shiwalik Chir Pine Forest and Moist Terai Sal Forest, respectively. Adult population of the species was meagre. Suitable strategies are required for species conservation and tree improvement program.

Regeneration Status and Population Structure

3C/C2c Moist Terai Sal Forest (n=30)



9/C1a Lower or Shiwalik Chir Pine Forest (n=80)



Conservation of Forest Genetic Resources

Establishment of Center of Excellence on Forest Genetic Resources (CoE-FGR)

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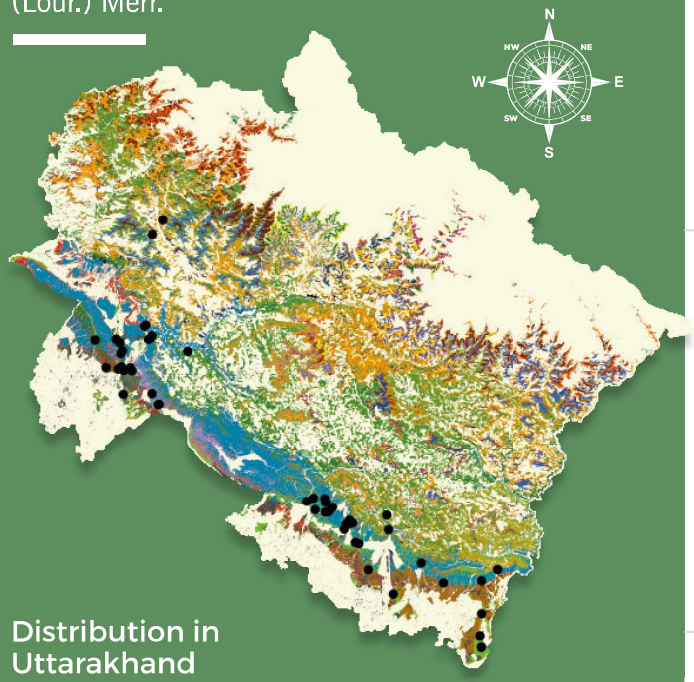
Uttarakhand State

Schleichera oleosa

(Lour.) Merr.



Distribution in Uttarakhand

Species occurs throughout the Sub-Himalayan tract, Central and outer hill ranges up to 1000m and fairly common in associated with Sal forests.

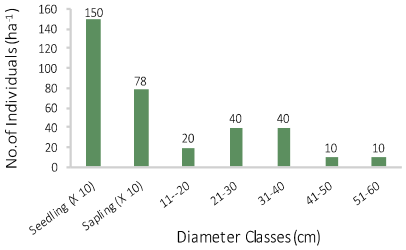
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1b, 5B/C2, 5/DS1 and 5/1S2.

Forest Divisions
Terai East, Ramnagar, Terai West, Champawat, Terai Central, Nainital, Haridwar, Lansdowne and Haldwani

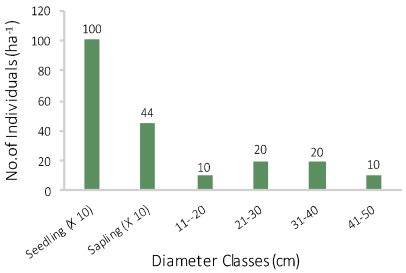
Overall 'good' regeneration was exhibited by the species. Highest seedling density value observed was 1,500 ha^{-1} in Northern Dry Mixed Deciduous Forest while the lowest value was 700 ha^{-1} in Moist Terai Sal Forest. Highest and lowest sapling density values recorded were: 780 ha^{-1} and 220 ha^{-1} in Northern Dry Mixed Deciduous Forest and Moist Terai Sal Forest, respectively. However, highest adult tree density value recorded was 150 ha^{-1} in Moist Terai Sal Forest, indicating adequate recruitment into adult trees. Higher density of tree individuals in lower diameter classes were observed indicating that species was evolving. Wild gene pool needs to be conserved for future improvement programme and species conservation.

Regeneration Status and Population Structure

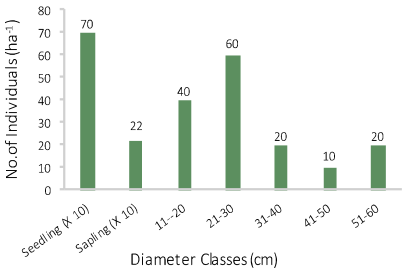
5B/C2 Northern Dry Mixed Deciduous Forest (n=120)



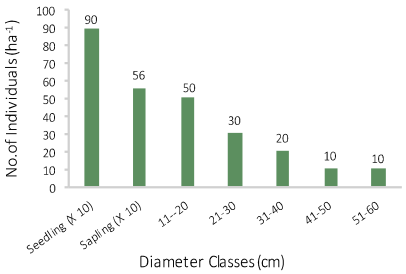
5B/C1b Dry Plain Sal Forest (n=60)



3C/C2c Moist Terai Sal Forest (n=150)



3C/C2a Moist Shiwalik Sal Forest (n=120)

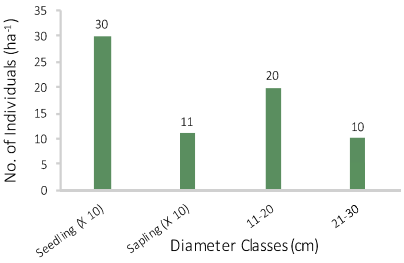


Semecarpus anacardium

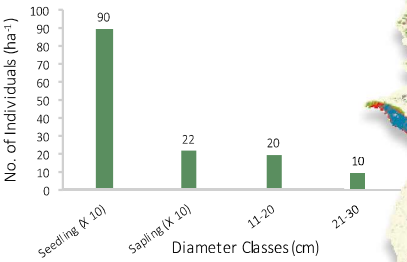
L. f

Regeneration Status and Population Structure

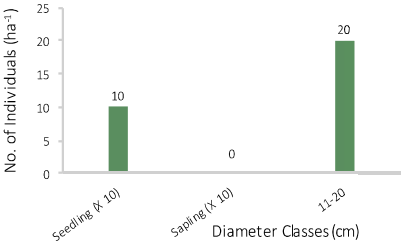
3C/C2a Moist Shiwalik Sal Forest (n=30)



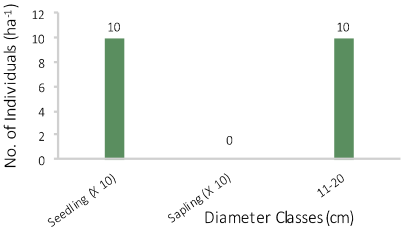
5B/C1a Dry Shiwalik Sal Forest (n=30)



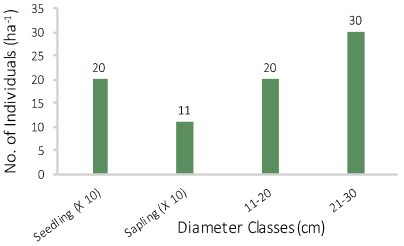
3C/C2c Moist Terai Sal Forest (n=20)

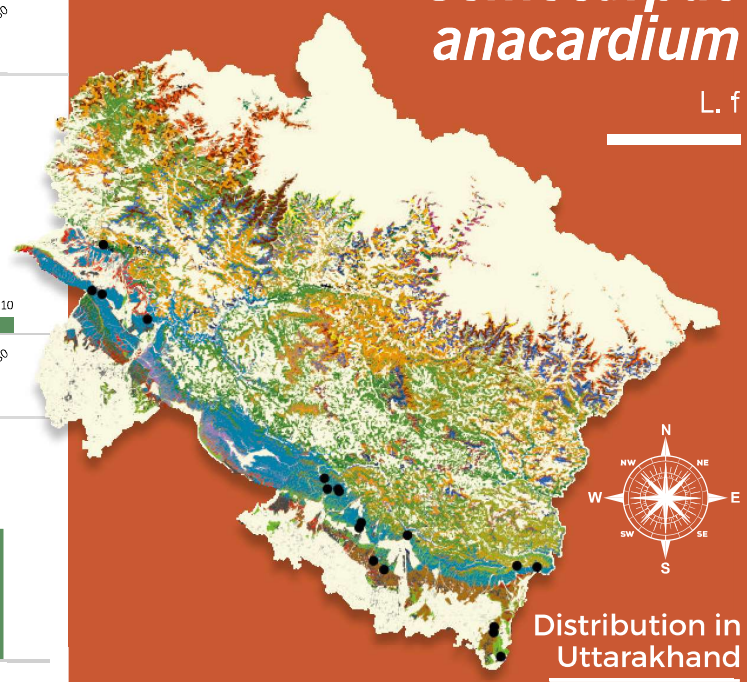


3C/C3a West Gangetic Moist Mixed Deciduous Forest (n=10)



5B/C2 Northern Dry Mixed Deciduous Forest (n=50)





Distribution in Uttarakhand

Species occurs throughout the Sub-Himalayan tract and the outer hill ranges up to 1,400 m.

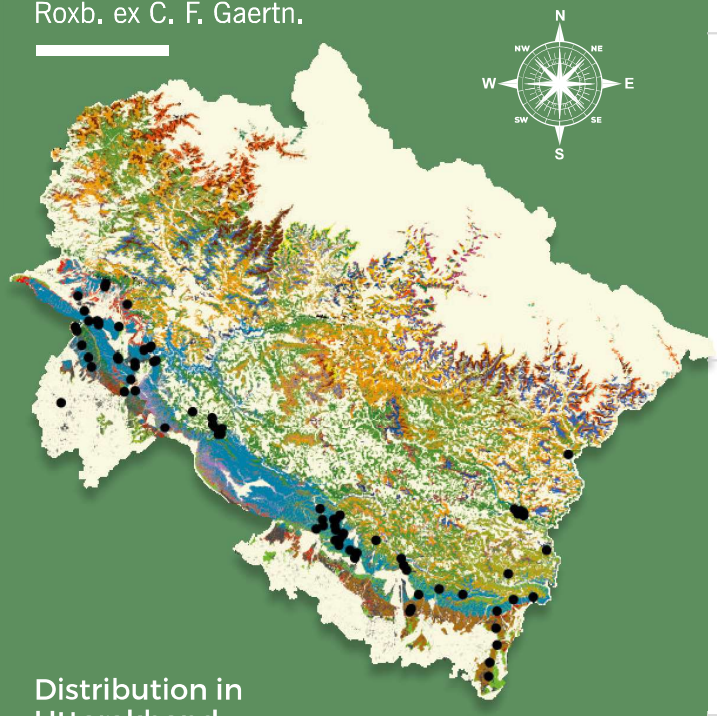
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C3a, 5B/C1a, 5B/C2, and 9/C1a.

Forest Divisions
Dehra Dun, Terai East, Ramnagar, Champawat, Haldwani and Terai Central.

Overall regeneration of the species was 'good' in three assessed forest types viz. Moist Shiwalik Sal Forest, Dry Shiwalik Sal Forest and Northern Dry Mixed Deciduous Forest. However, species exhibited 'fair' regeneration in Moist Terai Sal Forest and West Gangetic Moist Mixed Deciduous Forest. Highest seedling density value observed was 900 ha^{-1} in Dry Shiwalik Sal Forest while the lowest value of 100 ha^{-1} was recorded in Moist Terai Sal Forest and West Gangetic Moist Mixed Deciduous Forest. Highest sapling density of 220 ha^{-1} was in Dry Shiwalik Sal Forest. No sapling of species was observed in Moist Terai Sal Forest and West Gangetic Moist Mixed Deciduous Forest indicating disturbances in forest area. Overall population of adult trees was very low. Highest adult tree density value of 50 ha-1 up to 21-30 cm diameter class was observed in Northern Dry Mixed Deciduous Forest. Population is quite low in all assessed forest types. Suitable strategies are required for species conservation and tree improvement program.

Shorea robusta

Roxb. ex C. F. Gaertn.



Distribution in Uttarakhand

It occurs in the Sub-Himalayan tract and outer hills but rarely reaches an elevation up to 1,400m.

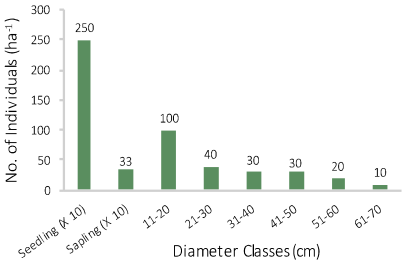
Occurrence in Forest Types
3C/C2a, 3C/C2c, 3C/C2d, 3C/C3a, 5B/C1a, 5B/C2, 5/DS1, 9/C1a, 9/C1b, 12/C1a, 12/C2b, 13/C2b and 16/E1

Forest Divisions
Champawat, Terai East, Pithoragarh, Ramnagar, Terai West, Nainital, Kalsi Soil Conservation, Dehra Dun, Tehri, Lansdowne, Haridwar and Haldwani.

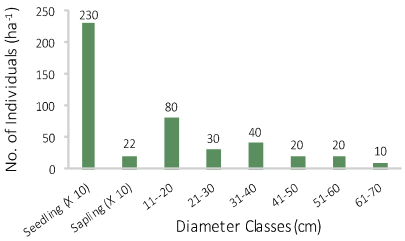
Overall regeneration of the species was 'good'. Highest sapling density was 4,000 ha^{-1} in Western Light Alluvium Plain Sal Forest and the lowest value was 300 ha^{-1} in West Gangetic Moist Mixed Deciduous Forest. Similar trend was observed in case of sapling. However, highest adult tree density value estimated was 360 ha^{-1} in Dry Shiwalik Sal Forest while the lowest was 50 ha^{-1} was in Western Light Alluvium Plain Sal Forest and West Gangetic Moist Mixed Deciduous Forest. Higher diameter classes of trees up to 71-80 cm were recorded in assessed forest types. This species is economically and ecologically very important. Suitable strategies are required for species conservation and its associates.

Regeneration Status and Population Structure

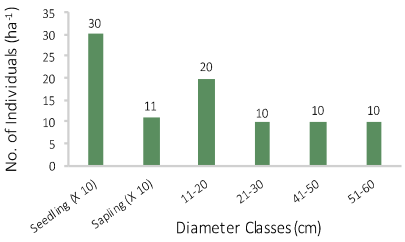
3C/C2c Moist Terai Sal Forest (n=230)



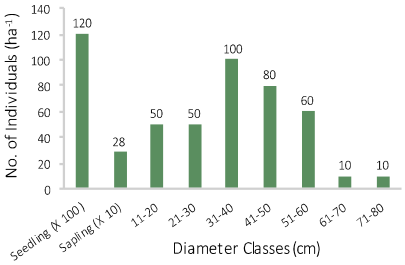
3C/C2a Moist Shiwalik Sal Forest (n=200)



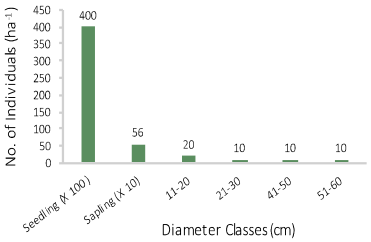
3C/C3a West Gangetic Moist mixed Deciduous Forest (n=50)



5B/C1a Dry Shiwalik Sal Forest (n=360)



3C/C2d (I) Western Light Alluvium Plain Sal Forest (n=50)



Conservation of Forest Genetic Resources

National Program for Conservation and Development of Forest Genetic Resources

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Pilot Project