

Ardu (*Ailanthus excelsa*)

Knowing the Species

(a) Natural Habitat and Classification

Ailanthus excelsa Roxb. is a lofty deciduous tree, though it is widely distributed in the country, it grows in the semi-arid and semi moist regions. In its natural habitat the absolute maximum shade temperature varies from 45⁰C to 47.5⁰C and the absolute minimum from 0⁰ to 12.5⁰C. The mean maximum temperature in the month of May is generally the highest. The temperature varies from 30⁰ to 42.5⁰C. The mean daily minimum temperature in January, the coldest month of the year varies from 4⁰ to 21⁰C.

The mean annual rainfall ranges from 500 – 1900 mm, sometimes even up to 2500 mm. The mean relative humidity ranges from 40-80 per cent in January and from 60-90 per cent in July. It has been found to be a suitable species for planting in dry areas of Rajasthan with annual rainfall of about 400 mm. It avoids moist areas having high monsoon rainfall.

It can grow on a variety of soils but thrives best on porous sandy loams. It avoids clayey soils with poor drainage and waterlogged areas. It can grow even on shallow dry soils but the growth is poor. *A. excelsa* has given better performance as compared to other species in lateritic soils. The tree can be seen growing upto an elevation of 900 metres.

Ailanthus belongs to a small family of about 30 genera, comprising about 200 species of shrubs and trees. About 10 species of the genera are found in the country. It belongs to family Simaroubaceae.

(b) Map of Distribution

It is indigenous in Central India in the northern part of the Peninsula. It is commonly found in south of the Ganges, in West Bengal, Bihar, Orissa and Andhra Pradesh. It also occurs in Rajasthan and Maharashtra. It is scarce in the Deccan and Karnataka and absent further in the south. It is generally absent in heavy rainfall areas of the west coast.

It occurs in the Southern tropical forest in association with khair, babul, neem, *prosopis*, etc. It grows in mixed deciduous forests and also in some sal forests. It also occurs in coastal areas of Andhra Pradesh and in dry belts of Tamil Nadu, West Bengal and Karnataka.

In Rajasthan, it is spread in dry tracts of Banswara, Barmer, Jodhpur, Tiwri, Churu, Sirohi and Mt. Abu. The species has been raised successfully as a soil conservation species in reserves raised by Jammu and Kashmir state.

A. excelsa is specifically found in the following types of forest in Northern dry mixed deciduous forests.

- Inundation babul forest
- Southern thorn forest.

(c) Growth Characteristics and Phenology

A. excelsa is a strong light demander. The seedlings get easily suppressed by weeds as a result of shading. It is sensitive to drought and is moderately frost tender, being killed by frost in exposed situations. The prolonged droughts kill the seedlings, though the poles and trees are drought resistant. In places, where winters are damp as well as cold, seedlings do not easily grow. The tree coppices well and produces root suckers freely. The tree is very susceptible to waterlogging or excess of moisture in the soil. It is easily broken by wind due to the brittleness of the stem and branches.

It can attain a height of 18 to 25 m and girth of 2.5 m and has a cylindrical bole.

It is fast growing species with a small whitish trunk. Branches are thick and spreading with a massive spreading crown. The bark is greenish or grey and smooth in young trees while in old trees, the bark is rough having large conspicuous leaf scars. It has large branches starting right from trunk and perpendicular to the trunk which tend to curve upwards.

The leaves are shed during the cold season and the new leaves appear in March-April, 3-9 dm long, pinnate; leaflets 8-14 pairs, 10-15 cm long alternate or subopposite, coarsely and irregularly serrate, oblique at base; petioles 5-8 cm long.

The flowers are small in size yellow in colour and arranged in panicles, appear in February – March in Central India and in the month of April in north India. The flowers appear in the large open clusters among the leaves; the male, female and bisexual flowers being intermingled on the same tree. Calyx lobes 1.5 x 1 mm, ovate triangular. Corolla petals 5, 4 mm long, ovate lanceolate reflexed, glabrous, Stamens 10 in the male flowers and 0 in the female flowers; filaments glabrous. Ovary 2-5 partite. Fruits samara, 4-7 x 1-1.2 cm lanceolate, acute at both ends, multiveined, twisted near base, reddish brown. The fruits are formed soon after flowering. The fruits ripen in May-June, just before the onset of monsoon.

(d) As a Plantation Tree

It is a suitable species for introduction as a plantation tree in social forestry, agroforestry, avenue plantation, industrial plantation and wasteland afforestation.

It is grown on hills and in taungya system. It can grow on variety of soils but avoids wet and waterlogged areas.

Utilization of the Species

(a) Properties Including Strength Properties

The wood is white and lustrous, with a faint yellowish colour. It is subject to stain. The wood is very light (density being 0.45). The weight of wood is 433 kg/m³. It is straight grained, fairly even and very coarse textured.

The wood is perishable in the open but not so in water, it is liable to white ant and insect attack.

(b) Use as Timber, Poles, Pulp and Paper, etc

Wood is straight grained, fairly even and very coarse textured. It is soft but fairly strong and holds nails well. Annual growth rings are indistinct. It is very easy to saw and work both by hand and machines. The timber is very light and perishable and the air dry weight is 27 lbs/cubic ft.

The timber is likely to develop fine, long widely spaced surface cracks. It is also liable to blue stain. It is a timber of box plank class, being light and fairly strong. The wood is used for packing cases, fishing floats and sword sheaths.

It is used as Grade III and Grade IV plywood. The pulp is obtained from debarked wood and is used in paper industry as a substitute for aspen, for printing papers. It improves the surface quality of paper.

(c) Use as Fodder

The leaves are rated as highly palatable and protein rich nutritious fodder for sheep and goats and are said to augment milk production. The tree is therefore largely planted on farm lands. An average tree yields about 5 to 7 quintals of green leaves twice a year. Some trees are lopped for green leaves while leaves from others can be lopped, dried and stored for feeding during scarcity period. The green leaves in some places are even marketed. The chemical composition of the leaves is as under:

Chemical composition of the leaves

Percentage of different constituents on dry matter basis								
	Moisture	Protein	ether extract	crude extract	N-free extract	total ash	Ca	P
Green leaves with twigs	70.44	16.25	3.00	21.85	47.48	11.43	1.48	0.17
Green leaves without twigs	72.56	19.8	33.96	14.26	41.99	19.96	2.00	0.26
Green leaves without twigs	67.89	19.87	3.53	12.82	51.81	11.97	2.11	0.24
Dry leaves treated with molasses 10% by wt.	8.45	19.5	63.68	13.52	47.74	15.50	2.42	0.17

The leaves are rich in crude protein, ether extract and calcium, but poor in phosphorus when dry or when chaffed with twigs. Crude fibre content is also low.

The green leaves are highly palatable and digestible, animals relish them better than the dry leaves even when the latter are treated with molasses to improve their palatability. The animals have to get used to acrid smell of these leaves. The digestibility coefficients of different nutrients are given in the following table.

Digestibility coefficients of various nutrients

Nutrients	Digestibility coefficients (%)		
	Green leaves with twigs	Green leaves without twigs	Dry leaves with 10% molasses
Dry matter	67.97	66.33	63.93
crude protein	80.18	81.73	86.05
ether extract	29.35	35.31	50.61
crude fibre	50.87	32.18	45.20
N-free extract	80.55	78.41	67.60
Total carbohydrate	72.66		

The digestibility coefficients are fairly high for all the nutrients except for ether extract whose digestion from leaves in the ruminants is generally low. The digestibility of different nutrients from green leaves is generally higher than that from dry leaves. Treatment of dry leaves with molasses improves the digestibility of crude protein, ether extract and crude fibre. The green leaves can serve as a maintenance ration for livestock, but leaves need supplementation by feeds rich in phosphorus. The tree starts giving fodder in the fourth year and onwards.

(d) Use as Fuel

The stem and branches are used for fuel wood but it gives poor quality fuel as it burns quickly and does not sustain heat for long.

(e) Use for Environmental Conservation

It is resistant to drought and soil conditions. It grows well on slopes. The species has been extensively used for soil conservation purposes. Even in arid regions of Rajasthan it has been planted as an avenue tree along the road side. The tree has been used successfully in agroforestry for planting around the margins of cultivated fields. Lopping of foliage is done twice in a year during the main cropping season, thus reducing competition. The tree is suitable for degraded and denuded areas and wastelands. It grows as a shade and avenue tree almost throughout the hotter parts of India. It grows well in arid and semi arid regions as well as both in plains and hills.

(f) Use in Industries

Wood of the plant is extensively used for making matchwood boxes and match splints

The wood is extensively used in cottage industries for making wooden toys and cheap quality cricket bats.

(g) Other Uses

It yields gum of inferior quality. The bitter and aromatic leaves of the plant show medicinal properties. The leaves are used for the preparation of lotions for scabies.

The chemical analysis of wood gave following results.

1. Cellulose, 51.6%
2. Pentosan, 14.3%
3. Lignin, 30.1%
4. Ash, 2.1%

The bark is bitter, astringent, anthelmintic and it is used in diseases like dysentery, bronchitis, asthma, dyspepsia and ear ache. The bark is also utilised in indigenous veterinary practices. Quassinoids and ailantic acid are isolated from bark.

Natural Regeneration of the Species Including Calendar

Its natural regeneration in the forest is usually not satisfactory. The seeds are very light and winged and are dispersed far wide by the wind. If the seeds fall on bare ground germination takes place early in the first rainy season after the fall of the seed, but the seedlings rarely survive due to the sensitiveness of the seedlings and their intolerance of heavy weed growth. A large proportion of seeds do not germinate and are destroyed. The natural regeneration of *Ailanthus excelsa* can be seen in urban areas in abandoned houses, in the thickets of *Prosopis juliflora* along the road sides, adjacent to boundary walls and also along the farm boundaries.

The seeds which are buried deep fail to germinate and seedlings in depression die due to poor drainage, weed competition and attack of pests.

Natural regeneration through coppice and root suckers is adequate. Coppice shoots are thinned for better development.

The seeds are available in May – June and natural regeneration comes up in July. Within one year the plant establishes itself.

Nursery Practices of the Species Including Calendar

(a) Nursery Site

The site is cleared of all growth in Nov.-Dec. The nursery soil should be light, porous and well drained. The soil should not be hard to work with. Some insecticides should be mixed with the soil. The seed beds should be well raised to allow drainage. If the beds are not being prepared the seeds are sown in polybags. The species is best raised by planting out nursery raised seedlings with balt of earth.

(b) Seed Collection and Storage

The seeds are light and winged and are easily blown away by wind. Therefore, the fruit bunches at the end of the branches should be cut with long handled tools as soon as they show signs of ripening. The seeds are dried on a clean floor so as to prevent seeds to be blown away by winds. The seeds are then separated and stored in sealed air tight tins after being thoroughly dried. The seeds should be used in the same year as they cannot stand storage till the second year. The seed loses viability fast but under proper storage conditions

they can remain viable for up to 240 days otherwise the normal viability is 4-5 months. The number of seeds in one kg is 8000-10,000.

(c) Sowing

Sowing of seeds in beds is carried out in the month of December-January. The seeds are sown in light soils in drills about 23 cm apart and lightly covered with soils. The seeds may also be sown directly in the polybags. After sowing, watering is done regularly but sparingly. Too much moisture will lead to damping off disease in seedlings.

The germination is epigeous. Germination starts in 8-10 days and is completed in about 40-45 days. No pre treatment is required for germination.

From one kg of seeds about 1425 healthy seedlings can be obtained. About 15 gm of seeds are required for sowing 1 sq. m of bed. Mixing of seeds with ash or pulverized soil ensures uniform sowing.

(d) Vegetative Propagation/Clonal Techniques

The cuttings raised in polybags can be used as planting stock after they sprout and root.

Ailanthus excelsa can also be planted by root shoot cuttings 2-3 cm in diameter, which are prepared from nearly one year old seedlings. Stump planting has given only 50 per cent success, however, pit planting is better than any other method.

(e) Pricking Out

The germination percentage is nearly 60-70 percent. One month or one half month old seedlings from mother beds are pricked out into plastic or another containers and kept till they become fit for planting.

(f) Fertilization

Soil, sand and farm yard manure in the ratio 3:2:1 is generally used as potting mixture for polypot raising. The application of urea mixed with water boosts up plant growth.

(g) Irrigation

The nursery beds are irrigated regularly but they require gentle and light irrigation as seedlings are susceptible to diseases such as damping off with heavy irrigations. Over watering causes damping off and root rot in the plants. Comparatively smaller transplants survive better than bigger ones, giving 70-80 per cent survival.

(h) Weeding

The young seedlings in nursery stage are very delicate and unable to compete with weeds. Timely and regular weeding of the nursery beds is necessary to avoid suppression and killing of seedlings. Weedings should be carried out in the month of January-February and April. Regular weeding and hoeing are beneficial in increasing both survival percentage and height growth. Regular weeding is more important than watering as is evident from nursery trials made at Clutterbuckganj, U.P. and is shown in the following table.

Treatment	Percentage survival	
	Eight months after sowing (in April)	Twelve months after sowing (in August)
Watered, Weeded	100.0	100.0

Watered, Unweeded	60.9	19.5
Unwatered, Weeded	51.0	33.8
Unwatered, Unweeded	33.0	8.0

Planting Practices of the Species Including Calendar

(a) Planting Site and Its Preparation

Ailanthus excelsa prefers sandy and porous soils. It comes up on slopes and also on stony patches under suitable moisture conditions. Too moist or water logged areas or area prone to frost should not be selected. After selecting the site, the area is cleared and 30 cm³ or 45 cm³ pits are dug out in the month of Feb-Mar and the soil is allowed to weather. The planting in pits is carried out in the month of July.

(b) Block Planting

For block planting nursery raised seedlings 6 to 10 months are used for planting in pits at a spacing of 3m x 3m or 5m x 5m. The seedlings which attain height of 50-100 cm are suitable for planting. The root shoot ratio of 1:2 is considered good for stump planting.

(c) Row and Line Planting

The row and line planting is carried out by planting saplings. Spacing of 5m is maintained in case of row or line planting. Regular watering and protection from animals is required till the saplings get established.

(d) Spacing

Spacing adopted for the species are: Block planting 3m x 3m; row and line planting 5m apart.

(e) Mixed Plantations

Ailanthus excelsa can be raised in the mixed plantations. In degraded, denuded and semi arid soils it is able to come up successfully with *Prosopis juliflora*. The spikes of *P. juliflora* give protection to *Ailanthus* plants.

A suitable mixture of tree species used in planting includes; *Acacia catechu*, *Albizia lebbek*, *Prosopis juliflora*, *Prosopis cineraria*, *Acacia leucophloea*, *Azadirachta indica*, *Dolichandrone falcata*, *Shorea robusta*, *Acacia nilotica*, *Pongamia pinnata*, *Ziziphus mauritiana*, etc. some fodder grasses can also be planted with *Ailanthus excelsa*.

(f) Application of Fertilizers

The ardu tree is fast growing and normally does not require organic or inorganic fertilizers in plantations.

In the arid regions of the country and in sandy soils, nitrogenous fertilizer application has given good response in the first year of growth in the plantation causing improvement in plant height by 24 per cent when urea was applied at the rate of 20 gm per plant. The effect and response of nitrogen application gradually diminishes in the second year. The effect of

phosphorus before planting in pits at the rate of 40 gm per plant in single doses leads to increase in collar growth in sandy soils.

(g) Irrigation

Normally no watering is required in moist areas. In arid and semi arid areas watering should be done if the rains are not received within one week of planting. Planting should be stopped if no rains are expected for a few days afterwards.

(h) Agroforestry

During the survey conducted around Jaipur, it was observed that *A. excelsa* has no adverse effect on the crops sown as understorey if proper care is taken. For having better results, the spacing adopted should be at least 6x6m. Regular lopping of the leaves should be done to minimise shade effect on the crops and ploughing of the root zone of crops should be done to remove the lateral roots of the tree so that there be no competition between tree and crop. Mostly wheat, millet, barley, mustard and Gwar crops are being taken with *A. excelsa*. It was found that 10 quintal/acre of wheat and 15 quintal/acre of barley is being produced when sown in the intermittent space of a 6m x 6m *A. excelsa* plantation. Farm forestry of *A. excelsa* is more popular and is being practiced by the farmers. Trees are planted at the south and west boundaries of the fields. It is essential to have trees on the south and west borders of the farm so that the velocity of wind could be reduced. Hence in farm forestry, the farmers are getting more yield of crops and generating revenue from *A. excelsa* tree as well.

Cultural Operations and Its Calendar

(a) Weeding

Timely and regular weeding for the first two years and soil working stimulates growth. In heavy soils three weedings may be required in the first year. Weeding should be carried out as below

1 st year	II nd year
1 st weeding – in July	One weeding in the month of August
2 nd weeding – in August	
3 rd weeding – in October (if required)	

Weeding should always be accompanied by hoeing, soil working, mulching and casualty replacement.

(b) Cleaning

Bushes which are likely to shade the plants should be cut. However, *Prosopis* bushes should be retained to give protection against animal damage.

(c) Thinning

Thinning is generally required under block planting. The first silvicultural thinning may be carried out in the seventh or the eighth year when the tree attains a height of 10-12 m.

Fencing is also needed in areas where the goats and sheep have become accustomed to eating it.

Pests, Diseases and Deficiencies

It is well documented that the tree species growing in the tropics suffer considerable losses from insect and pests both before and after harvest. Forest constitutes, one of the most productive renewable natural resources. Insect and diseases are one of the major biological determinants of forest productivity particularly in man made plantations. On account of high reproductive potential and short life cycle most of the forest insects in arid region multiply to amazing numbers. Some of the plant diseases are reported to spread quickly in the arid regions.

(a) In Nursery Stage

Seedlings are susceptible to damping off disease therefore heavy watering should be avoided and only optimum level of moisture should be maintained.

The species can not withstand cold and seedling growth is checked below 50⁰C. The growth is retarded considerably in the month of January. The seedlings are prone to porcupine damage.

The seedlings are susceptible to insect attack and are suppressed by weeds. For controlling insect, spraying or dusting with BHC or endosulphan insecticide is carried out.

The seedlings or saplings may be affected by web worm *Atteva fabriciella*. Severe defoliation affects plant growth and may cause death of the plant. The full grown larvae are grey in colour and live gregariously under a silk web spun over the leaves and shoots. They are controlled by application of 0.1 per cent of endosulphan and malathion.

(b) In Plantations

The tree is affected by several insect larvae. Repeated defoliation gives a serious set back to the growth of trees which are so weakened that they become an easy prey to the attack of the borer.

Severe defoliation due to *Batocera rufomaculata* causes the branches to fall off, leaving prominent scars with cracks on the main stem. There are suitable places for oviposition by the beetles.

Atteva fabriciella (*Ailanthus* webworm) is fatal and serious defoliator (occurring from April to June), which damages fruits, seeds and leaves. It is controlled by spraying 0.01 to 0.02 per cent formothion and fenvaluate and also by DDT, BHC, aldrin, dieldrin, endosulphan and malathion.

Atteva niveigutta is another serious defoliator. It is controlled by contact insecticides such as authio and chloridimeform or by sevin (0.01-0.02 per cent) sumicidin (0.01 – 0.02 per cent).

Eligma narcissus is another defoliator recorded on this species particularly in South India and whose control is suggested through biological and mechanical means.

Batocera rufomaculata is a serious pest which bores in the stems of young trees. The larvae bore irregular and extensive galleries. Spraying of kerosene or fuel oil is done in the larvae tunnels or the tunnels are plugged with cotton saturated with kerosene oil. Sometimes the bottom portion of the trunk is completely hollowed and the tree is blown down by wind.

The grub *Diboma proura* bores the young shoot and forms long tunnels. It is controlled by spraying 0.05 per cent phosphamidori or monorrotophos.

The leaf spot is caused by *Cercospora ailanthicola*, *C. glandulosa*, *C. simarrubacienses* and *Alternaria sp.* The disease appears in the form of necrotic spots on the leaves. The control measures include foliar spray of Bavistin or Dithane M-45 or fytolan (0.2 per cent) at fortnightly intervals.

Powdery mildew in the species is caused by *Ovulariopsis* and *Oidium sp.* It is controlled by foliar spray of 0.05% calixin.

In Ranipur (U.P.), four year old trees were found rolled up by *Psorosticha zizyphi*. If the attack continues the plants are unable to produce any normal leaves and become stunted which seriously retards the growth of the plants in addition to loss of fodder. Foliar spray of 0.25% malathion in April/May gives effective control. Fodder can be used for livestock after a fortnight of spraying. It is an occasional pest but it can be a menace for successful raising of Ailanthus plantations if the population of the pest increases immensely. The trees infected by insects are lopped and foliage is used for fodder immediately.

The leaf spot disease caused by *Alternaria sp.* has been recorded from Siwaliks (U.P.), causes early defoliation in one year old plants. The disease can be controlled by foliar spray of Blitox 0.02% at monthly intervals.

Powdery mildew caused by *Ovulariopsis sp.* has been reported from Poona (Maharashtra). Fungus produces white powdery appearance on leaf lamina. The pathogen is air borne and spreads through conidia on healthy leaves. The disease causes considerable losses in nurseries and young plantations. The disease can be checked by karathane E.C. 0.05% at 20 days interval.

Oidium ailanthi produces the symptoms in the form of white circular powdery growth on both the surface of leaflets and becomes irregular in severe infection. The entire surface becomes covered with the fungus leading to serious defoliation. No perfect stage is found. The disease was first time recorded from Hyderabad (A.P.)

Phome medicogines causes light brown leaf spots with red halo on leaflets of *A. excelsa*. The disease occurs in monsoon season in both nurseries and plantations. Foliar spray of Cu based fungicides can reduce the incidence of disease.

Growth Yield and Management of the Species

The growth of the trees of different ages at different sites at Jaipur planted under various geometries are as follows:

Location	Age (in years)	Av. height (in m)	Av. Gbh (in cms)	Spacing (in m)	Patter of plantation	Irrigated or rainfed
Adarsh Krishi Vaniki Farm, Agra Road Dahmi Kalan Nursery, Ajmer Road	7	7.4	41	3x3	Block	Rainfed
Maliyon Ki Dhani, Agra Road	30	22	223	5m. Apart	Farmbund	Rainfed
Daga Farm, Agra Road	20	12.6	133	6x6	Block	Rainfed
Jaju Agri Farm, Machwa Govindpura	8	6.7	69	6x6	Agroforestry	Irrigated
Research Farm, Khatipura	3	2.7	33	4x2	-do-	Rainfed
Newaru Village, Jhotwara Road	4	6.7	45	3m. Apart	Farm Forestry	Irrigated
Newaru Village, Jhotwara Road	8	10.3	85	-do-	-do-	Irrigated
Newaru Village, Jhotwara Road	13	10.5	124	-do-	-do-	Irrigated

If the plants are well weeded, growth is rapid. In experimental sowing at Dehradun, the following dimensions were reached.

End of second season – ht 0.06 m or more; end of third season – ht 2.4m or more; end of fourth season – ht 4.3m, girth 31.8cm

Large scale plantations of *Ailanthus excelsa* have been raised in Mohand Range of Shiwalik Forest Division, U.P. The average growth data were as follows:

Age (years)	3	6	11	16	21
Mean dia of crop (cm)	9.5	13.1	13.5	18.3	21.4
Mean height of crop (m)	6.65	10.5	11.5	10.95	12.80

The results of biomass estimation gave following data:

Dry weight by tree component of sample trees (kg/tree)

Age	Wood	Bark	Leaf	Twig	Branch	Total	Root	Total
3	7.27	3.44	0.80	1.20	2.01	14.72	3.69	18.41
6	20.30	7.84	1.04	1.43	3.20	33.81	7.57	41.38
11	24.19	9.62	0.31	1.40	5.16	40.98	7.32	48.30
16	43.04	13.44	0.92	2.40	15.00	74.80	13.55	88.35
21	24.90	8.89	0.93	0.72	5.64	31.08	8.52	49.90

Note: Some leaves and twigs were lopped by villagers.

Under irrigated conditions leaf fodder yield/tree with respect to age has been found as follows:

Age	Av. Yield/tree/lopping (in kg)
4	20
8	85
12-13	200

Economics of Planting the Species

The rotation of *A. excelsa* is considered as 20 years but it was found to go 30 years or more. The lopping is commenced from the fourth year onwards; i.e. leaf fodder from one tree is available for at least 20 years. It is estimated that an average tree gives about 5 quintal leaf fodder per year.

(a) Govt. Plantations

The leaves are used for fodder and wood is used in cottage industries for making toys, cricket bat and in match box industry. Since it is a bad fuel wood, its use in cottage industries should be encouraged.

(b) Farmland Plantations

The plantations are mainly undertaken by villagers on field bunds and in homestead plantations for additional fodder, firewood and cheap timber.

(c) Industrial Plantations

It is highly desirable for matchwood industries and is worked under the selection system with a minimum exploitable girth limit.

Harvesting and Its Calendar

Lopping of the tree is started from fourth year onwards. It was observed that lopping after seven years contribute to good fodder and better yield. For leaf fodder complete crown lopping is being done. The lopping is done twice or thrice in a year. Mostly lopping is done during November-January and May-July. Consequently these are the peak months of the availability of *A. excelsa* leaves in the market. During February-April, fodder availability is less due to shedding of old leaves and flowering and fruiting season. The branches can be used as small timber and should be cut after rainy season from well grown trees. The rotation suitable for *Ailanthus excelsa* crop is twenty year when it attains diameter of 20 cm or more. The harvesting should be carried out in the month of November-December for cottage industries.

Source Institutions for Detailed Information

Detailed information can be obtained from Institutes listed below:

- Forest Research Institute, Dehradun
- State Forest Research Institute, Jabalpur
- Arid Forest Research Institute, Jodhpur
- Tropical Forest Research Institute, Jabalpur
- CAZRI, Jodhpur
- Institute of Forest Genetics and Tree Breeding, Coimbatore-Tamil Nadu

Source: Indian Council of Forestry Research and Education, Dehradun. Ardu (*Ailanthus excelsa*). Dehradun, Forest Research Institute. 16p.