



Darek (*Melia azedarach*) - A potential root stock for raising vigorous Neem (*Azadirachta indica*) plants

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Azadirachta indica A. Juss, commonly known as Neem belongs to the family Meliaceae and is widely spread in Asia, Africa and other tropical parts of the world (Sombatsiri *et al.* 1995). It has long been recognized as a versatile multipurpose tree for a variety of uses including ayurvedic medicines, biopesticides besides very good charcoal, fuelwood, timber and landscape value. Neem oil, bark and leaf extracts have been therapeutically used as folk medicine to control diseases like leprosy, respiratory disorders, constipation and skin infections (Biswas *et al.* 2002). Many compounds such as limonoids, azadirone, azadirachtin, and flavonoids with curative potential, have been isolated from various parts of neem tree. Recent studies have shown that neem possesses anti-inflammatory, antiarthritic, antipyretic, hypoglycemic, antigastric ulcer, antifungal, antibacterial and antitumor properties (Bandyopadhyay *et al.* 2004, Sultana *et al.* 2007, Ebong *et al.* 2008, Mahapatra *et al.* 2012, Paul *et al.* 2011). Neem leaves mixed with stored grain have traditionally been used in India to repel insects and prevent food and seed losses. The principal active compound in the leaves is azadirachtin, which repels pests, acts as an anti-feedant, and disrupts insects' growth and reproduction. The importance of the Neem tree has also been recognized by the US National Academy of Sciences, which published a report in 1992 entitled Neem - a tree for solving global problems (Anonymous 1992).

This experiment was conducted at experimental farm of the College of Horticulture and Forestry, Neri, Hamirpur during 2017. Neem seedlings are usually grown from seed in nurseries as bare-root stock or in containers. Direct sowing is cost-effective but results in poor survival. The viability of fresh seed decreases rapidly after two weeks. Hence, the growers are bound to sow the Neem seeds in the month of August itself just after their ripening. The seedlings emerge within 1-3 weeks. Initial growth of Neem seedlings is very slow. By the beginning of winter (November), the seedlings are just 3-4 inches tall and not vigorous enough to withstand even mild cold, leading to 100 % mortality in low hills of

Himachal Pradesh. About 2500 number of Neem seedlings raised from seed sown in August were transferred in poly bags (9"×4") and kept in polyhouse (comparatively warmer than open conditions) to protect them from frost. All the seedlings died in the following winter even in polyhouse in low hills of Himachal Pradesh. Young seedlings also suffered from weed competition.

Because of huge mortality of Neem seedlings due to cold and weed competition since it is slow growing in initial stages of growth, it is imperative to augment the initial growth of Neem to produce vigorous plants capable of withstanding cold and weed competition. This gave an idea to raise nursery stock of Neem using alternative propagation techniques. Neem is closely related to *Melia azedarach*, a West Asian tree commonly known as Persian lilac, Bakain, Darek, or Chinaberry. Seed of *Melia azedarach* is available every year in plenty and the viability of the seed is quite long under normal storage conditions. Nursery raising of this species is comparatively much easy. Since, *Melia azedarach* is fast growing, hardy and well adapted to cool climate (upto 2000 m amsl in Himachal Pradesh), it was selected as rootstock for vegetative propagation of *Azadirachta indica* to boost latter's initial growth.

Ripened and dried fruits of Darek were collected in the month of January from local area (Hamirpur, HP). The fruits were depulped and separated stones dried in open sun were stored in cloth bags at room temperature. The stones (seeds) were sown in the nursery beds in the following March after soaking in tap water for 24 hours. The beds were watered regularly as per need. The germination started in seven days and completed within three weeks. The plants raised in nursery beds for two years were used as rootstock for budding *Azadirachta indica* in February. In total, 25 plants of *Melia azedarach* having pencil thickness were budded on 15th February employing chip budding method of vegetative propagation. Care was taken to make a sharp cut on root stock and scion wood. The scion wood was fixed properly on to the cut made on rootstock and tied firmly with polythene strip.

Scion wood of *A. indica* budded on *M. azedarach* rootstock started sprouting after 10 days of budding and

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Fig 1 Neem budded on Darek after 5 months and 9 months of budding

showed excellent bud take, survival and growth. Out of 25 grafts, 23 sprouted revealing a success of 92%. The budded plants grew very fast initially which could withstand competition from weeds. As Darek seedlings were budded with Neem (scion wood) in the month of February, about nine months growing season was available for the budded Neem sprouts to grow. By the end of first growing season (November), the budded Neem attained a height of eight feet with stout stem, branches and lush green foliage as against 4" in seedling origin plants (Fig 1). Hence, budding formed an excellent basis for production of vigorous Neem plants. The budded plants seem to be quite hardy as compared to the seedling plants and are expected to withstand cool climate. Further studies are being carried out to test these budded Neem plants in areas beyond its upper altitudinal limit in Himachal Pradesh for establishing Neem plantations in cooler regions.

SUMMARY

Neem is an indigenous tree species with medicinal and pesticidal properties. It is generally raised through seed which ripens in August in northern India. The seed viability is only for few weeks and the nursery men are bound to sow the seed in nursery immediately after seed ripening i.e. in August. The initial growth in nursery is very slow and the seedlings are very tender and lanky in first growing season which lasts hardly for about three months in northern India. Moreover, the species is highly

susceptible to frost and hence, it becomes very difficult to protect such tender seedlings during winter. To increase the period of growing season and produce vigorous nursery stock of Neem, it was thought to grow it on a potential root stock by way of budding/grafting. Darek (*Melia azedarach*) with wider adaptability in varied agro-ecological conditions was selected as a root stock. The experiment conducted in the month of February revealed excellent bud take, survival and growth. The budded plants attained a height of 8 ft in first growing season (February to November) as against just 4 inches of seedling origin plants. The technique has proved useful to enhance initial growth and to increase the growing period of Neem which resulted in production of tall and vigorous plants. The budding technique will also be very useful for cloning Neem. Further, experiments are required to be carried out for screening better genotypes of root stock (Darek) and scion (Neem) for improving growth and desirable traits of Neem.

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