

High density spacing trial of *Oroxylum indicum* and its feasibility as agroforestry crop

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ABSTRACT

Oroxylum indicum (Sheonak) is very important medicinal plants used by pharmaceutical and Ayurvedic companies in many formulations. Roots of Sheonak are one of the ingredients of traditional Ayurvedic formulations, viz., Chyavanaprasa, Dasamula, Awalwha, Narayana Taila, Brahma Rasayana and Dantadyarista. Roots can be harvested from one year to three year plant, at that stage plant has less branches and leaves, making it suitable as agroforestry species. Experimental trial was laid down using three different types of spacing viz., 0.75 m x 0.5 m, 0.75 m x 1 m and 0.75 m x 3 m using randomized block design (RBD) with seven replications. The spacing 0.75m x 1m depicted the maximum values for all the growth parameters and yielded 10 quintals of dry root per hectare. *Andrographis paniculata* (Kalmegh) was tried as an intercropping crop, which is a sun loving crop. Acceptable growth was observed and approximately 16 quintals of dry plant was recorded per hectare. The result of the present study reveals that agricultural crops may also be cultivated as intercrop and in result good returns can be achieved.

Key words : *Oroxylum indicum*, *Andrographis paniculata*, Ayurvedic formulations, Randomized Block Design, Replications

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INTRODUCTION

Oroxylum indicum (Bignoniaceae) a broken bone tree is a native tree often grow as an ornamental pant for its strange appearance. It is a medicinally important, medium sized, deciduous small tree found in India, Srilanka, China, Thailand, Philippines and Indonesia. In India it is spread in Eastern and Western Ghats and North-East regions known as 'Sonapatha'. *Oroxylum indicum* (Kurz.) which is a traditional herbal medicine in China and Japan (Kamkaen *et al.*, 2006). Mostly sighted along the river banks or slopes of the hills, except in the western drier area, the plant is distributed throughout India and South East Asia. The existence of *O. indicum* in natural population is highly threatened and it has been categorized as vulnerable medicinal plant by the government of India (Kumar and Ved, 2000)

The root bark and stem bark possess anti-allergic properties and are used in treating allergic disease, urticarial, jaundice, asthma, sore throat, laryngitis, hoarseness, gastralgia, diarrhea, dysentery, infantile, erythema and measles (Manonmani *et al.*, 1995; Bhattacharje, 2000) . The normal dose is reported 8 to 16g of bark in form of decoction, extract or powder (Mao A A, 2002). The seeds are active in chronic cough and gastralgia: 5 to 10g daily in the form of a decoction or powder and also used as purgative.

To increase the plant production per unit area for better economic returns the involvement of adoption of modern, innovative and hi-tech methods is the demand of the day. One such strategy is the high density plantation, which refers to planting at the closer spacing that the normally recommended

spacing.

Bhardwaj *et al.*, (2001) laid down experiment on *Populus deltoids* in randomized block design with three densities viz. 60 cm x 60 cm (27,777 plants/ha), 90 cm x 90 cm (12,345 plants/ha) and 120 cm x 120 cm (6,944 plants/ha) under rain fed conditions in mid hill zone of Himachal Pradesh. The plantation harvested after 13 years, produced maximum biomass (218.08t/ha) in the closest spacing of 60 cm x 60 cm for which the bole contributed 90.71 per cent of the total above ground biomass accumulation. The nutrient accumulation in the biomass also differed with the density. The maximum nutrients were present in the closest spacing. It was further observed that organic carbon content in the soil decreases with the decrease in density. Conversely, an increase was observed in nitrogen, phosphorous and potassium content of soil with the increase in spacing. Study reveals that accumulation of nutrients in the biomass is higher in 60 cm x 60 cm spacing whereas, the nutrient return through litter fall was less as compared to the total uptake which created nutrient deficit in the soil.

The present study aims production of more

raw material per unit area to the pharmaceutical industries on commercial basis vis a vis to see the feasibility as agro forestry crop so that to gain more economic return at root level.

MATERIALS AND METHODS

Sheonak seedlings were planted at the institute nursery during first week of July 2014 using three high density spacing.

1. 0.5m (row to row) x 0.75m (plant to plant),
2. 1m (row to row) x 0.75m (plant to plant), and
3. 3m (row to row) x 0.75m (plant to plant).

Randomized block design was applied using above listed three treatments, seven replications and nine plants per replication per treatment. *Andrographis paniculata* (Kalmegh) was planted as intercrop with Sheonak, to see the feasibility of high density spacing as agroforestry spacing. After one year, data on growth parameters was recorded (five plants per replication per treatment) and analyzed statistically.

RESULTS AND DISCUSSION

Significant variation were observed at 5 % level of significance in all the growth parameters among the high density spacing, however spacing of 1 m x 0.75 m

Table 1. Variation among growth parameters of *Oroxylum indicum* planted at different spacing

Treatment	Plant Height (cm)	Collar Diameter (cm)	Fresh Root Weight (g) per plant	Dry Root Weight (g) per plant
0.75 x 0.5m	23.83	2.50	18.41	5.22
0.75 x 1m	40.63	5.15	197.25	74.98
0.75 x 3m	33.94	4.44	162.86	51.80
Mean	32.80	4.03	126.17	43.99
CD _{0.05}	8.19	0.82	87.95	36.88

Table 2. Range, Mean and Coefficient of Variation of growth data in *Oroxylum indicum*

Parameter	Range	Mean	Coefficient of Variation (%)
Plant Height (cm)	17-77	32.80	12.75
Collar Diameter (cm)	2-18	4.03	1.55
Fresh Root Weight (g)	10.51-232.61	126.17	67.74
Dry Root Weight (g)	2.90-92.12	44	73.82

and 3 m x 0.75 m at par with each other for all the growth characters. The Table 1 depicted that the spacing of 1 m x 0.75 m revealed maximum plant height (40.63 cm), collar diameter (5.15 cm), fresh root weight (197.25 g) and dry root weight (74.98 g). A good variation was observed for all the growth characters (Table 2) showing future improvement in this species. The spacing 0.75 x 1 m obtained the maximum values for all the growth parameters and yielded 10 Quintals of dry root per hectare. Roots are the major part which is used in many Ayurvedic preparations (Manonmani *et al.*, 1995).

As per as the high density spacing experiment is concerned, no work has been carried out in this species till date (Yashoda *et al.*, 2004).

Andrographis paniculata (Kalmegh), a sun loving medicinal crop (Niranjan *et al.* 2010; Kumar, 2011) was tried as an intercropping with Sheonak. The intercrop Kalmegh performed satisfactorily and produced approximately 16 Quintals of dry plant per hectare. Thus, intercropping of agricultural crops can easily be done with high density plantation of *O. indicum* for better economic returns.

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