# INFLUENCE OF NPK AND SPACINGS ON THE GROWTH AND YIELD OF HERBAGE OF *CALLICARPA MACROPHYLLA* VAHL PRIYANGOO: A LESS KNOWN MEDICINAL PLANT

***A.K. Sharma, K.S. Negi, D.C. Bhandari*, H.Y. Shukla* and S.K. Pareek****
*National Bureau of Plant Genetic Resources, Regional Station,*
*Bhowali- Niglat, Nainital 263 132, Uttaranchal*
** National Bureau of Plant Genetic Resources, Pusa Campus, New Delhi 110 012*

## INTRODUCTION

Priyangoo *(Callicarpa macrophylla* Vahl.) is an important less known medicinal plant of the lower warm valleys of the Himalaya. It belongs to family Verbenaceae. It is a perennial, deciduous shrub attaining 2.5 m height. Essential oil obtained from different parts of priyangoo through steam distillation and clevenger apparatus (hydro distillation) revealed oil content in young leaves and tender stem (0.04%), panicles (0.03%) and seeds (0.13%) while no essential oil content was observed in the roots. The active chemical ingredients were noticed in the leaves and tender stems of priyangoo oil such as low boilers and monoterpenorids 22.5% (α- thujone, α-pinene, sabinene, β-pinene, α-phellandrene, P-cymene, Cineole 1:8, Linalool, Borneol, Terpine 4-ol, α-terpineol, δ-terpineol, Eugenol, β-Bourpenene, β-Etemene etc.) and high boilers sesqui-terpenoids 77.5% (sesqui-terpene, hydrocarbon, caryophyllene oxide, sesquiterpene alcohol, etc.). The essential oil was analysed (GLC) at chemistry unit, NBPGR, New Delhi.

The parts of this plant are used to cure many diseases such as rheumatic pains and stomach disorders. The bark is used to heal cut and wounds (Megoneitso and Rao, 1983). Seeds and roots are used for digestion and abdominal trouble by the Natives of Gori Valley, district Pithoragarh (Balodi, 1988) and leaves are used in rheumatism in Garhwal Himalayan (Nautiyal, 1980 and Sharma *et al.,* 1979). The fruits are used by Tharus of Kheri District in Uttar Pradesh for blisters and boils (Maheswari, 1988).

This species has been ignored till the later part of last century. NBPGR, Regional Station, Bhowali, Nainital made efforts for its introduction, preliminary evaluation and maintenance to develop agro-techniques, i.e., date of sowing, fertilizers doses, spacing and all agricultural relevant handy packages and practices under a project of Central Scheme for Development of Agro-Techniques and Cultivation of Medicinal Plant in Ayurveda, Sidha and Unani and Homeopathy (ISM&H). The present paper deals with the response of spacings and chemical fertilizers on the yield of herbage. The balance nutrition and optimum plant spacings are two important tools for obtaining higher foliage yield but the information on these two aspects of priyangoo are meagre. Therefore, efforts were made to find out optimum and balanced fertilizer doses with suitable spacings for this species.

## MATERIALS AND METHODS

The experiment was conducted at National Bureau of Plant Genetic Resources, Regional Station, Bhowali, Nainital during kharif seasons of 1999 to 2000. The soil of the experimental site was sandy loam and stony in texture with pH 5.7. The treatments included 4 levels of fertilizers, i.e. control (no fertilizers) 40:20:10 kg N: P2O5:K2O; 80:40:20 kg N: P2O5:K2O and 120:60:30 kg N: P2O5:K2O/ha and spacings 50 x 25 cm, 50 x 50 cm and 50 x 75 cm. The experiment was laid out in Split Plot Design and plot size was 3 x 3 M with 3 replications. The rooted plants were planted in the flat beds. The plants seedlings were raised in green house/glass house under controlled conditions (R.H. 80% and temperature 20-25$^{o}$C). The entire dose of phosphorus (as single super phosphate), potassium (as muriate of potash) along with half dose of nitrogen (as urea) was applied at the time of sowing. The remaining half dose of nitrogen was applied as top dressing in two equal intervals, after six and twelve month of transplanting. Biometrical observations were recorded after 3,6,9,12 and 15 months on three randomly selected plants from each plot. The characters were recorded on plant height (cm), number of branches, number of tillers, plant spread (cm$^2$), stem diameter, herbage yield/plot as presented in Table 1.

**Table 1**. Effect of different spacing and NPK levels on the growth and herbage yield of Callicarpa macrophylla

| Treatment | Plant Height (cm) Months | | | Plant spread ($cm^2$) Months | | | No. of Branches Months | | | Stem diameter (mm) Months | | | No. of tillers/plant Months | | | Herbage yield/ plant (g) | Herbage yield/ plot (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9 | 12 | 15 | 9 | 12 | 15 | 9 | 12 | 15 | 9 | 12 | 15 | 9 | 12 | 15 | | |
| Spacings ($cm^2$) | | | | | | | | | | | | | | | | | |
| 50 x 25 | 22.17 | 69.53 | 143.93 | 497.27 | 2639.93 | 6783.07 | 4.07 | 6.38 | 7.18 | 5.74 | 9.01 | 11.70 | 2.42 | 4.90 | 5.10 | 371.58 | 23.93 |
| 50 x 50 | 23.53 | 71.28 | 152.15 | 647.80 | 4016.37 | 9155.77 | 5.33 | 9.22 | 9.87 | 6.15 | 9.40 | 14.06 | 3.25 | 5.73 | 6.18 | 514.42 | 21.24 |
| 50 x 50 | 19.85 | 64.33 | 135.67 | 724.98 | 4109.32 | 11562.92 | 6.28 | 10.18 | 10.87 | 6.18 | 9.87 | 14.44 | 3.22 | 5.65 | 6.47 | 607.58 | 17.87 |
| CD at 5% | 1.38 | 3.37 | 4.92 | 35.07 | 205.61 | 861.96 | 1.10 | 0.8 | 0.59 | NS | 0.47 | 0.22 | NS | NS | NS | 71.18 | 1.81 |
| NPK Levels | | | | | | | | | | | | | | | | | |
| 0:0:0 | 18.84 | 62.00 | 128.62 | 507.04 | 3097.16 | 7955.44 | 4.10 | 6.27 | 6.82 | 5.86 | 8.37 | 11.35 | 2.78 | 5.51 | 5.98 | 399.33 | 15.88 |
| 40:20:10 | 22.98 | 67.24 | 140.77 | 556.60 | 3450.38 | 8935.04 | 5.02 | 8.20 | 9.00 | 6.00 | 9.32 | 13.03 | 3.18 | 5.44 | 6.18 | 478.44 | 20.71 |
| 80:40:20 | 25.11 | 73.31 | 155.11 | 754.14 | 4141.71 | 10185.89 | 6.24 | 10.76 | 11.18 | 6.40 | 10.23 | 15.38 | 3.00 | 5.47 | 5.87 | 605.56 | 24.96 |
| 120:60:30 | 20.47 | 69.20 | 151.18 | 675.62 | 3664.91 | 9592.62 | 5.47 | 9.16 | 10.22 | 5.84 | 9.78 | 13.84 | 2.89 | 5.29 | 5.64 | 508.11 | 22.48 |
| CD at 5% | 0.56 | 2.97 | 3.01 | 25.67 | 142.59 | 788.03 | 0.27 | 0.67 | 0.45 | NS | 0.36 | 0.20 | NS | NS | NS | 47.78 | 1.20 |

## RESULTS AND DISCUSSION

### Effect of NPK

Different doses of NPK varied significantly for various characters following the trend of spacings applications of NPK. Doses at 80:40:20kg/ha resulted significantly higher values of plant height, plant spread, and number of branches, stem diameter and number of tillers per plant at different developmental stages along with highest herbage yield per plant (605.56g) and per plot (24.96kg) as against the trend of wider spacing. This indicates that both excessive and in sufficient doses of NPK were not good for the performance of the Callicarpa in soils of rainfed sub temperate Himalayas.

On the bsisof above experiment, it appeared that planting of Priyangu at 75x50 cm spacing with application of NPK dose at 80:40:20kg/ha is best component of cultural practices for commercial of Priyangu in rainfed sub temperate Himalaya.

### Effect of spacing

Statistical analysis of the data indicates that different spacing had significant effect of Priyangu for most of the characters except stem diameter at 9 month of transplanting and no. of tillers per plant at developmental stages herbage yield per plant was found to be maximum (607.58 g) with spacing of 75x50 cm, significantly higher than that in other spacings. However, promising spacing of 75x50cm for herbage yield per plant was not accompanied with maximum herbage yield per plot (23.93kg) in 50x25 cm spacing. Such type of un-co-relative results were due to nominal differences in herbage yield per plant in different spacing and accommodations more number of plants in larger area. Therefore, closer spacing between plants should be adopted in nutritiously poor soils of steps sloppy land of sub temperate hill for commercial cultivation of Callicarpa macrophylla. Higher herbage yield per plant was a complete with higher stem diameter at after 12 and 15 months of transplanting (9.87 and 14.44 mm. respectively), plant spread and number of branches at all developmental stages undesirable association of plant heights and number of tillers per plant in faced that these two traits did not contribute to the herbage yield. Therefore, higher herbage yield in wider spacing was due to production of more number of thicker branches affording spreading nature to plants.

## ACKNOWLEDGEMENTS

The authors are thankful to the Director, NBPGR, Pusa Campus, New Delhi for encouragement and providing facilities. We are also thankful to Ministry of ISM & H, New Delhi for financial assistance.

**REFERENCE**

Balodi, V., 1988. Introductory note on the enthnobotany of Gori Valley. J. Econ. Tax. Bot. 12: 453-455.

Maheshwari, J.K., Singh, K.K. and Saha, S., 1980. Ethnomedicinal uses of plants by Tharus in Kheri Distt. U.P. Bull. Medico. Enthnobot. Res. 1: 318-337.

Megoneitso and Rao, R.R., 1983. Enthnobotanical studies in Nagaland-4. Sixty two medicianl plants used by the Agami Nagas. J.Econ. Tax Bot. 4: 167-172.

Nautiyal, S., 1980. Some medicinal plants of Garhwal hills- A traditional use. J. Sci. Pl. Med. 2: 12-18.

Sharma, P.K., Dhyani, S.K. and Shanker, V., 1979. Some useful and medicinal plants of Dehradun Siwalik. J. Sci. Res. P. Med. 1: 17-43.