



Agronomic Manipulation in Brahmi (*Bacopa monnieri*) Cultivation For Higher Productivity in Assam Plains

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ABSTRACT

Brahmi [*Bacopa monnieri* (L.) Wettst] is one of the most popular medicinal herb in Indian Pharmacopeia. It has been used as brain tonic and mind refresher in Ayurvedic, Homoeopathic, Siddha and Folk medicines. Realizing the importance of scientific support for the sustainable and large scale production of Brahmi, an agronomic trial was conducted with an aim to develop an acclimatized package of cultivation practices for the plains of Assam. The experiment was conducted at the Instructional-cum-Research Farm of Assam Agricultural University (AAU) under medium-land rainfed conditions during summer season. The study revealed that the crop is very sensitive to soil nutrient status, spacing and availability of moisture in the soil. Addition of organic manure resulted faster spread and ground coverage of the crop and the optimum dose was determined as 2t ha⁻¹ enriched compost. Organic manure improved the soil health by increasing the organic carbon content nearly to 17 per cent after the first harvest of the crop and also improved the water holding capacity of the soil. The planting of 12 to 15 cm long rooted slips with a spacing of 20 cm between rows and 10 cm between plants resulted faster ground coverage that gave better competitive ability of the crop against the associated weeds. The highest yield (144.17 g m⁻²) on dry weight basis was obtained with the application of 2t ha⁻¹ enriched compost at spacing of 20cm x 10cm, after 6 months of planting. In addition, this treatment also yielded 996 numbers m⁻² of rooted slips. The results were very promising for acceptance of Brahmi for commercial cultivation and entrepreneurship development

Key Words: *Bacopa monnieri*; Package of practices; Commercial cultivation.

INTRODUCTION

Brahmi [*Bacopa monnieri* (L.) Wettst] is an important medicinal herb. It is found throughout the Indian subcontinents in wet, damp and marshy areas. It belongs to the family Scrophulariaceae and has a chromosome number of 2n = 64. It requires a warm- moist climate with a temperature range of 30 to 40°C and a relative humidity of 60 to 80 per cent with a good sunshine duration. Thus, the climatic and edaphic conditions of plains of Assam are very ideal for Brahmi cultivation. It is usually used as a memory booster. Besides this, it is also used in the treatment of cardiac, respiratory and neuropharmacological disorders like insomnia, insanity, depression, psychosis,

epilepsy and stress (Russo and Borrelli, 2005). In addition, it was also reported to possess anti inflammatory, analgesic, antipyretic, sedative, free radical scavenging and anti-lipid peroxidative activities (Anbarasi *et al*, 2005; Kishor and Singh, 2005). In spite of availability of all the favorable environmental conditions and also its usefulness, its commercial cultivation is restricted to very few pockets of Assam, that too in a very small scale and without following proper scientific method of cultivation; that is mainly due to the lack of site specific low cost agro technology of the crop. So in order to develop an acclimatized and organic agro-technique, an attempt was made to work on the fertility and spacing management of the crop.

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MATERIALS AND METHODS

A field experiment was conducted during summer season (January to August) of 2011 at the Instructional-cum-Research Farm of Assam Agricultural University (AAU) under medium land rainfed condition with a sandy loam texture. The soil was high in P_2O_5 (62.58 kg ha⁻¹), organic carbon (1.09%), medium in K_2O (273.28 kg ha⁻¹) and low in N (251.06 kg ha⁻¹) with acidic reactions. The experiment consisted of 16 treatment combinations which included 4 different doses of organic manures [F₁: 3t Enriched compost (EC) ha⁻¹; F₂: 2t EC ha⁻¹; F₃: 3t EC of which 25% w/w was supplemented with Farmyard manure (FYM) and F₄: 2t EC of which 25% w/w was supplemented with FYM] and 4 different spacing (S₁: 20cm x 10cm; S₂: 20cm x 20cm; S₃: 30cm x 20cm and S₄: 30cm x 30cm). Enriched compost was prepared by hipping layers of woody materials of plant biomass, green leafy materials, thick brown materials like rice straw and a thin layer of Azolla over which thin slurry of cow dung and water was sprinkled in a pit. It was kept for 2-3 months and collected in polythene sheets, when colour changed from brown to black. It was further kept for 1 month for final curing and then enriched with Rock Phosphate @ 5-10 kg q⁻¹ and Phosphate Solubilizing Bacteria (PSB). EC prepared in this manner contains (0.84% N, 0.94% P_2O_5 , 0.57% K_2O and 6.72%) Organic Carbon. On an average, Farm Yard manure consists of 0.3-0.5% N, 0.2% P_2O_5 and 0.3-0.5% K_2O . Stale seed bed technique was followed to control the early emerged weeds, where the plot was left undisturbed for 25 days. The weeds which appeared were removed mechanically without using any chemicals. Organic manures were incorporated 7 days ahead of transplanting for its proper decomposition. Local germplasm of Brahmi was used as the planting material. 10 to 15 cm long cuttings were transplanted on 1st of March, 2011 by maintaining the required spacing.

RESULTS AND DISCUSSION

The highest yield of leafy twigs on dry weight basis without roots and with roots (93.33 g m⁻² and 164.17 g m⁻², respectively) were obtained in the treatment where planting was done with a spacing of 20 cm between rows and 10 cm between plants. Besides, it also yielded highest

number of rooted slips (966 m⁻²). Yield gradually decreased with the increase in spacing. This might be due to the increasing competition with weeds that developed due to the availability of open space under wider spacing of the crop; narrow spacing helped to check the weed growth more efficiently than the wider spacing (Table 1). Relation between closer spacing (10 cm x 10 cm) and higher yield was also observed in Jammu by Sharma *et al* (2005).

Application of 2t EC, with or without supplementation of FYM enhanced faster ground coverage of the crop at 30 days after transplanting (DAT). However, more than 90.0 per cent ground coverage was obtained nearly at 90 DAT in all the treatments (Table 2). Amongst, the spacing tested in the experiment, 20 cm x 10 cm showed better area coverage at 30 DAT. Irrespective of manuring treatments, the closer spacing showed better ground coverage in the early part of crop growth, however, percent ground coverage was more responsive to FYM application in between 30 to 60 DAT (Table 2). Good response of FYM and faster ground coverage has also been reported in Brahmi by Shirole *et al* (2005) at Rahuri. It indicated that application of FYM helped Brahmi in faster area coverage, which means better branching and faster elongation of prostrate branches. The highest yield of green herbage on dry weight basis has been obtained under the application of 2t ha⁻¹ EC (F₂) which was followed by the treatment that received 2t EC having 25% w/w supplementation with Farmyard manure (F₄). Besides, it also yielded 827 m⁻² and 801 m⁻² numbers of rooted slips, respectively (Table 1).

CONCLUSION

Looking towards the growing up demand of Brahmi, the experiment conducted to develop an agro-technique suitable for Assam plains, resulted the need of application of EC for faster growth and early harvest. EC when applied @ 2t ha⁻¹, more than 64% of ground coverage was seen within 30days of planting under the spacing 20cm x 10cm and 20cm x 20cm. It also gave the highest yield of herbage (144.17 g m⁻²) on dry weight basis. Supplementation of 25 per cent w/w of this dose of EC with FYM, delayed the spread of Brahmi, but the rapid growth was recorded

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Table 1. Number of rooted slips and herbage yield under different spacing and doses of organic manure of Brahmi.

Treatment	Dry weight of leafy twigs without roots (g m ²)	Dry weight of leafy twigs with roots (g m ²)	Number of rooted slips
Spacing			
20cm x 10cm	93.3	164.2	996
20cm x 20cm	72.5	143.3	869
30cm x 20cm	66.7	127.5	697
30cm x 30cm	40.8	98.3	602
CD (P=0.05)	0.43	0.39	2.63
Organic manures (t h⁻¹)			
3t EC	64.2	130.8	827
2t EC	81.7	144.2	827
3t EC, 25%w/w supp. with FYM	56.2	122.5	716
2t EC, 25%w/w supp. with FYM	68.33	135.83	801
CD (P=0.05)	0.43	0.39	2.63

Table 2. Ground coverage (%) of Brahmi at 30, 60, 90, 120 and 150 days after planting under different doses of organic manure and spacing.

Treatments	30 DAT	60 DAT	90 DAT	120 DAT	150 DAT
Organic manures (t h ⁻¹)					
3t EC	50.2	79.0	94.8	97.3	98.7
2t EC	51.4	85.3	96.0	99.0	100.0
3t EC, 25%w/w supp. with FYM	47.7	77.7	90.3	95.7	98.7
2t EC, 25%w/w supp. with FYM	50.8	80.1	95.3	98.7	99.3
CD (P=0.05)	0.95	0.84	0.98	N.S.	1.05
Spacing					
20cm x 10cm	64.7	88.7	97.7	100.0	100.0
20cm x 20cm	59.3	81.1	95.1	98.7	100.0
30cm x 20cm	40.4	76.7	93.7	97.7	99.7
30cm x 30cm	35.7	75.7	90.0	94.3	97.0
CD (P=0.05)	0.95	0.84	0.98	3.90	1.05

between 30-60 days after planting. In addition narrow spacing reduced the growth of competitive weeds. Thus, under medium-land rainfed condition and warm moist sub-tropical climate, the crop flourishes well and increased the harvest frequency when it is transplanted with a spacing of 20 cm x 10 cm and a dose of 2t EC ha⁻¹ is applied.

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