

EFFECT OF SEED TREATMENT WITH PLANT GROWTH REGULATORS ON BHENDI (*Abelmoschus esculentus* L.) GROWN UNDER SODIC SOIL CONDITIONS

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ABSTRACT

Field experiment conducted with seed treatment of plant growth regulators indicated that gibberellic acid at 50 ppm is the most effective treatment for bhendi under sodic soil conditions. This treatment recorded the highest germination, seedling establishment, total DMP, harvest index, number of fruits per plant and yield of fruits. Gibberellic acid at 50 ppm recorded the highest vegetable yield of 15.7 t/ha followed by GA 75 ppm with 14.8 t/ha. The control recorded only 8.07 t/ha of yield.

KEY WORDS: Bhendi, Gibberellic acid, Sodic soil, Salt tolerance

Bhendi is an important vegetable crop cultivated in all parts of Tamil Nadu. The tender fruits are used as vegetable and marketed in fresh form and sometimes it is processed into canned or dehydrated vegetable. The fruits are rich in protein, minerals and also good source of vitamin A, B and C. In Tamil Nadu, bhendi is cultivated in more than 2000 ha with annual production of 26,687 tonnes (Anon, 1986). The area and production of bhendi can be further increased if the problem soils are brought under cultivation with bhendi. Bhendi is regarded as moderately tolerant to salinity. Soil salinity is a major abiotic stress that limits crop. Salt injury affects germination and early seedling growth. The germination and vigour can be improved by pre-sowing treatments with different chemicals and growth regulators (Vijayakumar *et al.*, 1988). With a view to improve the vigour of seeds and to induce tolerance to sodicity, auxins, gibberellins and cytokinins were administered as seed treatment and the results are presented in this paper.

MATERIALS AND METHODS

A field trial was conducted during July to November, 1992 and 1993 at Soil Salinity Research Centre, Tiruchirapalli. Seeds of MDU-1 bhendi were used for the study. The experiment was laid out in RBD with eleven treatment replicated thrice. A plot size of nine m² per treatment comprising 80

plants per plot was maintained. The soil pH was 0.25 dsm⁻¹ 8.9, with EC 0.25 dSm⁻¹ and ESP 20.5. The available N, P and K were 245, 10.5 and 212 kg per/ha respectively. The bhendi seed were presoaked with the following treatments for 16 hours and air dried (Vijayakumar *et al.*, 1988).

1. Control
2. Water soaking
3. IAA 25 PPM
4. IAA 50 PPM
5. IAA 75 PPM
6. GA₃ 25 PPM
7. GA₃ 50 PPM
8. GA₃ 75 PPM
9. Benzyl Adenine (BA) 20 PPM
10. BA 40 PPM
11. BA 60 PPM

A seed rate of 7.5 kg per/ha was followed. Two seeds per hill were dibbled on one side of the ridge at a spacing of 30 cm. The ridges were formed at 45 cm apart. A basal fertiliser dose of 25 tonnes of FYM 20 kg N, 50 kg P₂O₅ and 30 kg K₂O was applied. Top dressing of 20 kg N/ha was done on 30th day

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after sowing. Thinning was done on 10 days after sowing allowing one plant per hill. The experiment was conducted for two years and the data collected were pooled and analysed. Observations on germination (on 7th day), seedling establishment (on 15th day) were recorded. The total dry matter production, both in the vegetative and fruits were estimated and harvest index was worked out for different treatments. The observations on the number of days taken for first flowering, total number of flowers produced, number of fruits per plant and fertility co-efficient were also recorded.

The fresh and dry weight of fruits per plant and yield per plot were recorded. The yield (t/ha) was estimated based on the yield per plot.

RESULTS AND DISCUSSION

The influence of seed treatment of plant growth regulators on germination, seedling establishment, total DMP and harvest index are presented (Table-1). The germination percent ranged from 60.5 to 85.8. The GA₃ at 50 ppm recorded the highest germination of 85.8 per cent followed by GA₃ at 25 ppm with 80.0 per cent germination. The seedlings establishment was also highest in GA₃ at 50 ppm which recorded 80.4 per cent as against only 40.4 per cent in the control.

Table 1. Influence of seed treatment with plant growth regulators on germination, seedling establishment, total dry matter production and harvest index in bhendi

Treatments	Germination (%)	Seedling establishment (%)	Total DMP (g/plant)	Harvest Index
Control	60.5	40.4	125.6	31.87
Water soaking	60.5	40.5	131.8	31.41
IAA 25 ppm	65.8	56.4	140.0	33.27
IAA 50 ppm	71.2	57.4	158.0	32.91
IAA 75 ppm	72.5	60.0	162.1	33.35
GA ₃ 25 ppm	80.0	62.4	234.8	29.98
GA ₃ 50 ppm	85.8	80.4	259.1	41.02
GA ₃ 75 ppm	79.5	71.4	245.0	34.69
BA 20 ppm	71.5	61.5	224.5	28.54
BA 40 ppm	72.0	60.0	235.9	31.16
BA 60 ppm	72.0	61.0	234.2	31.68
CD (P=0.05)	8.14	12.04	96.54	6.52

The increased germination and seedlings establishment might be due to the beneficial effect of GA₃ on activating the enzyme systems which would have increased the salt tolerance nature. The treatments besides promoting vigour and germination of seeds, improved the field performance (Basu, 1977). In general, the total DMP increased with the growth regulator treatments, the highest value being at GA₃ 50 ppm. The highest harvest index of 41.02 per cent was obtained in GA₃ 50 ppm as against only 1.87 per cent in the control indicating the effectiveness of GA₃ in improving the dry matter partitioning. These findings are in agreement with the findings of Yadi Reddy and Gopal singh (1985) and Sumabai *et al.* (1987) who reported that an increase in DMA in greengram due to GA application. The number of days taken for first flowering was the lowest in GA₃ 50 ppm (36.5 days) as against 41.5 days in the control (Table 2). GA₃ 50 ppm reduced the days for first flowering production by six days indicating the effectiveness in early flowering. The total number of flowers produced and number of fruits formed were also the highest in GA₃ 50 ppm. Yanger and Desai (1987) reported that foliar spray of 20 ppm NAA on chillies at 20th day after planting resulted in early flowering. Spray of GA

Table 2. Influence of seed treatment with plant growth regulators on floral behaviour in bhendi

Treatments	Days to first flowering	Total flowers per plant	No. of fruits per plant	Fruits fertility co-efficient (%)
Control	41.5	13.6	8.9	65.4
Water soaking	41.5	14.0	9.0	64.3
IAA 25 ppm	40.5	14.8	9.5	64.2
IAA 50 ppm	40.0	15.6	10.0	64.1
IAA 75 ppm	40.0	16.0	10.2	63.2
GA ₃ 25 ppm	38.0	17.4	11.0	63.2
GA ₃ 50 ppm	36.5	18.5	12.5	67.6
GA ₃ 75 ppm	38.0	16.0	12.5	78.1
BA 20 ppm	40.0	15.5	10.5	67.7
BA 40 ppm	41.5	16.5	9.8	61.3
BA 60 ppm	42.0	16.0	10.6	66.3
CD (P=0.05)	1.95	1.47	1.29	4.72

Table 3. Influence of seed treatment with plant growth regulators on yield of fruits in bhendi

Treatments	Mean single fruit fresh weight (g)	Mean single fruit dry weight (g)	Yield plant (g)	Yield/plot (Kg)	Yield (t/ha)
Control	10.2	4.5	90.8	7.26	8.07
Water-soaking	10.8	4.6	97.2	7.78	8.64
IAA 25 ppm	12.5	4.9	118.8	9.54	10.60
IAA 50 ppm	11.8	5.2	118.0	9.45	10.50
IAA 75 ppm	11.9	5.3	121.4	9.72	10.80
GA ₃ 25 ppm	12.8	6.4	140.8	11.25	12.50
GA ₃ 50 ppm	18.4	8.5	166.8	14.13	15.70
GA ₃ 75 ppm	16.5	6.8	151.5	13.32	14.80
BA 20 ppm	17.4	6.1	141.5	10.9	12.20
BA 40 ppm	13.2	7.5	129.4	10.35	11.50
BA 60 ppm	16.5	7.0	134.9	11.25	12.50
CD (P=0.05)	3.02	1.37	23.69	2.19	2.44

advanced flowering in soybean also (Sarma and Shah, 1979). Bhattacharjee (1985) also indicating that flower production could be induced by GA at 100 ppm in Jasmine. In bhendi, Rattan et al., (1987) reported that LAA at 10 ppm + GA 30 ppm as foliar spray significantly advanced flowering by 6.33 days. The mean single fruit fresh weight, dry weight of fruits, yield per plant, plot and on hectare basis were the highest in the the GA₃ 50 ppm concentration (Table-3). The highest yield of 15.7t/ha was recorded in GA₃ 50 ppm followed by GA₃ 75 ppm with 14.8t/ha. The Control on the other hand recorded only 8.07 t/ha of yields. Similar results were reported in other crops like Groundnut also. Soaking of groundnut and pea seeds in 10 ppm solution of NAA and GA were found to increase the pod number and seed yield of both the crops (Krishnamoorthy, 1987). It is therefore evident that seed treatment with GA₃ at 50 ppm is the best treatment for getting the highest yield of bhendi grown under sodic soil conditions.

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