

Effect of nitrogen and organic plant food supplements and stimulants Vegimax and Mahaagrozyme on growth, yield attributes and yield of cotton (*Gossypium hirsutum*)

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ABSTRACT

A field experiment was conducted for 3 years (2001–03) at the Indian Agricultural Research Institute, New Delhi, to study the effect of Vegimax and Mahaagrozyme, two organic plant food supplements, and stimulants on cotton (*Gossypium hirsutum* L.). The optimum levels of application were found to be 0.25 ml/litre water for Vegimax and 3 ml/litre water for Mahaagrozyme. Vegimax and Mahaagrozyme were not effective when applied along with fertilizer nitrogen. However, with farmyard manure both Vegimax and Mahaagrozyme were quite effective and resulted in highest seed-cotton yield.

Key words : Vegimax, Mahaagrozyme, Cotton, Organic plant food

Interest in organically produced agricultural products including cotton has considerably increased during the last 2 decades (Kopke, 1995; Srivastava *et al.*, 2002; Endale *et al.*, 2002) and organic plant food supplements, and stimulants have gained importance. Vegimax, a natural plant food supplement, contains organic N, P and K, Vitamin B complex, some amino acids and minerals Ca, Mg, S, Fe, Mn, Cu, Zn, B, I, Co, Mo, Se and Cr. Advantages of Vegimax application are reported in soybean (Pasaribu, 1983), vegetables (Urolo *et al.*, 2000) and grapes (Pena, 2001). Similarly, Mahaagrozyme, a plant food supplement and stimulant, contains various biologically active ingredients, viz. essential amino acids, enzymes, carbohydrates and vitamins. As no reports are available on the effect of these 2 plant food supplements and stimulants on cotton, the present study was conducted.

MATERIALS AND METHODS

The field experiment was conducted to study the effect of Vegimax and Mahaagrozyme on cotton at the farm of the Indian Agricultural Research Institute, New Delhi, during rainy (*khari*) season (mid-May–mid-November) of 2001 to 2003. The crop received 30 kg N/ha as urea, 30 kg P_2O_5 /ha as ordinary superphosphate and 30 kg K_2O /ha as muriate of potash at sowing of cotton and 30 kg N/ha at square-initiation stage in the first year of study.

During the first year of study (2001), 2 separate trials were conducted to determine the optimum concentrations of Vegimax and Mahaagrozyme for spraying cotton. In

Trial 1, Vegimax was sprayed @ 0.05, 0.1, 0.15, 0.20, 0.25, 0.35, 0.40, 0.45 and 0.5 ml/litre water. There were 3 sprays during the crop growth period, first at 60 days after sowing, the second at square initiation and third at flowering. In each spray, 700 litres water was used. In addition, there were 2 treatments, viz. control (water spray) and seed treated with Vegimax @ 1 ml/kg seed. The soil was low in available N (232 kg/ha) and medium in available P (20 kg/ha) and K (243 kg/ha). The pH and organic content of the soil was 7.89 and 0.41 respectively. The experimental design was randomized block with 3 replications.

In Trial 2, four concentrations of Mahaagrozyme (@ 1, 2, 3 and 4 ml/litre water) were tested against the control (water spray) and seed treatment with Mahaagrozyme @ 2 ml/kg seed. Other experimental details were same as in Trial 1.

The Trial 3, was designed on the basis of findings of Trials 1 and 2 and was conducted during 2002 and 2003 in same design with 3 replications. The treatments were 12 combinations of 4 fertility levels [control, 30 kg N/ha as urea, 60 kg N/ha as urea and farmyard manure (FYM) @ 12 tonnes/ha] and 3 spray treatments (water spray, Vegimax spray @ 0.2 ml/litre water and Mahaagrozyme spray @ 3 ml/litre water). There were 3 sprays during the crop growth period as per details in Trial 1. All plots received 30 kg P_2O_5 /ha as ordinary superphosphate and 30 kg K_2O /ha as muriate of potash. Nitrogen was applied in 2 splits, half dose at sowing and the rest half dose at

sequare-initiation stage.

In all the 3 trials cotton variety 'Pusa 8-6' was sown at 75 cm × 30 cm spacing in mid-May and harvested in mid-November. Rainfall received during crop growth period was 600.6 mm in 2001, 422.9 mm in 2002 and 810.0 mm in 2003. Number of irrigations applied were 3 in 2001, and 2002 and 2 in 2003.

RESULTS AND DISCUSSION

Trial 1

Plant height and boll weight in cotton were not significantly increased due to seed treatment or sprays with Vegimax (Table 1). Seed treatment with Vegimax, however, significantly increased bolls/plant and seed-cotton yield over the control. Spraying with Vegimax @ 0.25 ml/litre water was at par with higher concentration and significantly superior to lower concentrations in respect of boll weight and seed-cotton yield and was therefore used in further studies in Trial 3.

Trial 2

Plant height and bolls/plant were not significantly affected by seed treatment over spray application of Mahaagrozyme (Table 2). Bolls/plant obtained with the

spraying of Mahaagrozyme @ 2 ml/litre water was at par with concentration of 3 or 4 ml/litre water and significantly superior to lower concentration, seed treatment and the control.

Seed-cotton yield obtained with spraying of Mahaagrozyme @ 3 ml/litre water was at par with 4 ml/litre water concentration and significantly superior to lower concentrations, seed treatment with Mahaagrozyme and the control. Spraying with Mahaagrozyme with 3 ml/litre water was therefore used in further study in Trial 3.

Trial 3

All the characters studied were significantly affected by treatments (Table 3). In both the years, each successive level of N significantly increased the plant height in cotton and the tallest plants were obtained with the application of 60 kg N/ha. Plant height obtained with farmyard manure application was at par with 30 kg N/ha and significantly inferior to 60 kg N/ha. A significant increase in plant height of cotton due to Mahaagrozyme spray was obtained when no-nitrogen or farmyard manure was applied. Vegimax spray did not increase plant height in cotton significantly in absence or presence of nitrogen or farmyard manure.

Table 1. Effect of Vegimax sprays of different concentration on cotton

Treatment	Plant height (cm)	Bolls/plant	Boll weight (g)	Seed-cotton yield (q/ha)
Control (water spray)	152	9.7	3.41	11.2
Seed treated with Vegimax	157	10.4	3.42	12.3
Spraying of Vegimax @ 0.05 ml/litre water	154	12.0	3.43	13.7
Spraying of Vegimax @ 0.10 ml/litre water	155	12.8	3.48	13.9
Spraying of Vegimax @ 0.15 ml/litre water	155	13.0	3.52	14.2
Spraying of Vegimax @ 0.20 ml/litre water	157	14.5	3.51	14.8
Spraying of Vegimax @ 0.25 ml/litre water	156	15.0	3.51	15.1
Spraying of Vegimax @ 0.30 ml/litre water	157	15.2	3.50	15.1
Spraying of Vegimax @ 0.35 ml/litre water	155	15.3	3.51	15.0
Spraying of Vegimax @ 0.40 ml/litre water	155	15.3	3.52	15.0
Spraying of Vegimax @ 0.45 ml/litre water	155	15.4	3.52	15.2
Spraying of Vegimax @ 0.50 ml/litre water	158	15.4	3.53	15.3
CD (P = 0.05)	NS	0.4	NS	0.5

Table 2. Effect of Mahaagrozyme sprays of different concentration on cotton

Treatment	Plant height (cm)	Bolls/plant	Boll weight (g)	Seed-cotton yield (q/ha)
Control (water spray)	151	10.6	3.41	12.4
Seed treated with Mahaagrozyme	154	11.0	3.42	12.6
Spraying of Mahaagrozyme @ 1 ml/litre water	156	13.4	3.44	13.4
Spraying of Mahaagrozyme @ 2 ml/litre water	156	15.6	3.50	14.8
Spraying of Mahaagrozyme @ 3 ml/litre water	157	15.6	3.50	16.8
Spraying of Mahaagrozyme @ 4 ml/litre water	157	15.7	3.51	16.9
CD (P = 0.05)	NS	0.4	NS	1.7

Recommended dose of N, P and K @ 60, 30 and 30 kg/ha applied

Table 3. Effect of nitrogen, Vegimax and Mahaagrozyme on cotton

Treatment	Plant height (cm)		Bolls/ plant		Boll weight (g)		Seed cotton (q/ha)	
	2002	2003	2002	2003	2002	2003	2002	2003
Control	150	147	14.6	14.4	3.48	3.51	16.5	13.2
Vegimax spray	154	152	17.8	15.6	3.52	3.70	16.9	15.0
Mahaagrozyme spray	160	156	18.0	16.8	3.53	3.92	16.9	15.2
30 kg N/ha	164	160	18.5	16.9	3.57	4.13	18.2	18.5
30 kg N/ha + Vegimax	165	162	19.4	17.2	3.57	4.21	19.5	19.8
30 kg N/ha + Mahaagrozyme	165	164	19.6	17.5	3.57	4.23	19.8	20.0
60 kg N/ha	170	169	20.0	18.0	3.95	4.32	21.0	23.5
60 kg N/ha + Vegimax	170	168	20.2	18.0	3.96	4.51	21.6	25.0
60 kg N/ha + Mahaagrozyme	171	166	20.3	18.1	3.96	4.52	21.9	25.2
FYM (12 tonnes/ha)	163	160	20.1	18.2	4.12	4.34	21.3	26.1
FYM + Vegimax	164	162	20.1	18.6	4.18	4.74	22.0	28.6
FYM + Mahaagrozyme	164	163	20.2	18.6	4.20	4.82	22.2	28.8
CD (P = 0.05)	6	5	4.0	4.0	0.05	0.36	2.2	2.4

In both the years a significant increase in bolls/plant was obtained only with an application of 60 kg N/ha or FYM. Vegimax or Mahaagrozyme spray had no significant effect on bolls/plant in cotton.

In 2002, boll weight of cotton significantly increased with each successive level of N, while in 2003 the increase owing to 30 kg N/ha over the control was significant but there was no further significant increase when the level of N was increased to 60 kg N/ha. An application of FYM resulted in the heaviest bolls in both the years, significantly more than 60 or 30 kg N/ha in 2002. Mahaagrozyme spray also increased with boll weight in cotton when no fertilizer was applied or when FYM was applied. Vegimax spray increased boll weight in cotton only when FYM was applied.

Each successive level of N significantly increased seed-cotton yield in both the years and FYM application gave as good or even better yield than 60 kg N/ha. Prasad and Prasad (1996) reported good response of cotton up to 60 kg N/ha. The results obtained in this study also indicated the importance of FYM which in addition to supply N slowly supplies micronutrients and this may have resulted in increased yields owing to FYM application. However, in both the years sprays with Vegimax and Mahaagrozyme along with FYM application recorded the highest seed-cotton yield significantly more than FYM application in 2003. Thus Vegimax and Mahaagrozyme plant food supplements and stimulants may be advantageously employed in organic cotton production.

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