The outcome of this study will help in a better understanding of these soils in addition to forming a sound basis of soil management.

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EFFECT OF AGROCHEMICALS ON FLOWER PRODUCTION, BUD AND BOLL SHEDDING AND YIELD OF COTTON (*Gossypium hirsutum*)

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ABSTRACT

With a view to explore the possibilities of reducing bud and boll shedding of cotton, an experiment was conducted at the Tamil Nadu Agricultural University, Coimbatore, during the winter season of 1984-85 (Aug - Feb) under irrigated condition. Different ratios of NPK with and without 25 kg $ZnSo_4$/ha, different foliar sprays such as NAA (40 ppm), CCC (40 ppm) and DAP (3%) individually or in combination with and without topping formed the treatments. The study revealed that application of 80:60:60 kg of NPK either with 25 $ZnSo_4$/ha or with foliar spray combination of NAA (40 ppm) + DAP (3%) and with topping at fifteenth node increased the dry matter production, number of bolls per plant and seed cotton yield followed by application of 80:40:40 kg NPK with 25 kg $ZnSo_4$/ha and they were comparable between themselves. The bud and boll shedding was significantly reduced by the foliar spray combination of NAA (40 ppm) + DAP (3%) along with topping at fifteenth node resulting in increased seed cotton yield. The flower production was significantly reduced due to the spraying of NAA and CCC either individually or in combinations.

KEY WORDS : Agrochemicals, Cotton, Flower Production, Bud, Boll Shedding

The cotton crop under irrigated conditions is known for its loss of buds and bolls through physiological causes and pest attack. The yield of cotton is proportional to the number of bolls produced per plant which in turn depends upon the number of flowers per plant as well as amount of shedding of squares. Kamalanathan (1960) observed 40.5 per cent bud shedding due to causes other than insects. Bhatt *et al* (1982) reported that foliar spraying of NAA or DAP was equally effective in reducing the physiological shedding of fruiting bodies. Damodharan (1975) stated that spraying of CCC reduced the rate of flowering. Salem and Roshdy (1983) reported that application of $ZnSO_4$ increased the boll number per plant. So the use of growth regulators such as alpha naphthalene acetic acid (NAA) and 2 chloro-ethyl trimethyl ammonium chloride (CCC) and nutrient spray of diammonium phosphate (DAP) 3 per cent and nutrient management of NPK and $ZnSO_4$ and topping were tried for the purpose of reducing bud and boll shedding. The main objective of use of growth regulating chemicals was to attain vegetative growth and fruiting to achieve higher retention of bolls per plant.

MATERIALS AND METHODS

Field experiment was conducted at the Tamil Nadu Agricultural University, Coimbatore, under irrigated condition with MCU 9 cotton (*Gossypium hirsutum* L.) during the winter season of 1984-85 on sandy clay loam soil with a P_H of 8.0 and EC of 0.135 m.mhos/cm. Soil was low in available N (130 kg/ha), medium in available P_2O_5 (16.8 kg/ha) and high in available K_2O (490 kg/ha). The experiment was laid out in a randomised block design with three replication. Different ratios of

Table 1. Effect of agrochemicals on fruiting points, flower production, bud shedding, boll shedding, boll retention and seed cotton yield

Treatments	Fruiting points (No/plant)	Flower production (No/plant)	Bud shedding (No/plant)	Bud shedding (%)	Boll shedding (No/plant)	Boll shedding (%)	DMP 75 DAS (kg/ha)	Boll retention (No/plant)	Seed cotton yield (kg/ha)
80:40:40 kg NPK/ha (Control)	68.50	48.15	12.45	18.18	24.80	51.50	2428	23.37	2760
80:60:60 kg NPK/ha	68.10	48.40	11.60	17.03	24.02	49.63	2510	24.18	2845
80:80:80 kg NPK/ha	69.55	48.90	12.65	18.18	24.95	51.42	2435	23.14	2790
80:40:40 kg NPK/ha + 25kg $ZnSO_4$/ha	68.60	50.10	10.40	15.16	22.95	45.81	2680	27.15	3204
80:60:60 kg NPK/ha + 25kg $ZnSO_4$/ha	69.70	50.65	11.05	15.85	22.85	45.11	2790	27.80	3280
80:80:80 kg NPK/ha + 25kg $ZnSO_4$/ha	69.50	48.45	13.05	18.78	24.38	50.75	2480	24.07	2905
80:40:40 kg NPK/ha + F.S. of NAA 40 PPM	60.24	42.44	9.40	15.60	18.05	42.53	2420	24.39	2895
80:40:40 kg NPK/ha + F.S. of CCC 40 PPM	60.80	40.66	11.93	19.62	20.05	49.31	2274	20.61	2650
80:40:40 kg NPK/ha + F.S. of DAP 3%	65.90	46.35	11.35	17.22	21.70	46.82	2500	24.65	2908
80:40:40 kg NPK/ha + F.S. of NAA 40 PPm + DAP 3%	59.20	43.20	7.20	13.85	17.42	40.32	2640	25.78	3110
80:40:40 kg NPK/ha + F.S. of CCC 40 PPm + DAP 3%	58.70	40.15	10.55	17.97	20.35	50.68	2262	19.80	2550
80:40:40 kg NPK/ha + topping	65.85	46.10	11.75	17.82	21.70	47.07	2462	24.40	2901
80:40:40 kg NPK/ha + F.S. of NAA 40 PPM + DAP 3% + topping	58.60	42.10	8.50	14.51	14.82	34.47	2740	27.30	3267
80:40:40 kg NPK/ha + F.S. of CCC 40 PPM + DAP 3% + topping	61.86	40.95	12.81	20.71	21.25	51.89	2270	19.70	2547
CD at 5%	4.21	2.46	1.49	2.18	2.51	3.94	142.0	0.88	122.51

N:P:K *viz.*, 1: 0.5 : 0.5 (80 : 40 : 40 kg NPK/ha),1 : 0.75 : 0.75 (80: 60 : 60 kg NPK/ha), 1: 1 : 1 (80 : 80 : 80 kg NPK/ha) with and without application of 25 kg $ZnSO_4$ formed the fertiliser treatments. The different ratios of N : P : K with and without 25 kg $ZnSO_4$/ha were applied as basally to the treatments. Foliar spray treatments consisted of NAA (40 ppm), CCC (40 ppm), and DAP (3%) individually and the combination of NAA (40 ppm) + DAP (3%), CCC (40 ppm) + DAP (3%) with and without topping at fifteenth node (90 DAS). All the foliar spray treatments were imposed besides the basal dressing with 80 : 40 : 40 kg NPK/ha. Foliar spraying was given in two rounds on 65th and 80th day after sowing. Daily count on flower production and shedding fruiting bodies was made. The data on bud and boll shedding are presented as percentage of the total number of fruiting bodies was made. The data on bud and boll shedding are presented as percentage of the total number of fruiting bodies and flowers per plant respectively.

RESULTS AND DISCUSSION

The observations on fruiting points per plant, flower production per plant, bud and boll shedding (number and percentage), dry matter production (kg/ha), boll number per plant and seed cotton yield (kg/ha) were taken and the data recorded are presented (Table 1).

Different ratios of N: P : K with and without 25 kg $ZnSO_4$/ha did not influence the flower production and fruiting points per plant. However, the flower production and the fruiting points per plant were higher in 25 kg $ZnSO_4$/ha applied treatments but the effect was not consistent. Foliar

spraying of NAA and CCC either individually or in combinations with and without topping significantly reduced the flower production and fruiting points per plant over control. Similar findings were reported by Dastur and Asana (1960) in respect of NAA and Damodharan (1975) in respect of CCC application. As the rate of flowering was reduced due to the spraying of NAA and CCC, the total number of fruiting points was also reduced in NAA and CCC treatmental combinations.

The bud shedding per plant and bud shedding percentage were significantly reduced in foliar spray of NAA (40 ppm) either individually or in combinations with NAA, DAP and topping. But the minimum bud shedding per plant and the percentage was recorded in foliar spray combination of NAA (40 ppm) + DAP (3%) followed by foliar spray combination of NAA (40 ppm) + DAP (3%) with topping and were comparable with each other. Shedding of buds by the cotton plant is governed by auxin and abscission interactions. Spraying of NAA and DAP was equally effective in reducing the physiological shedding of buds and bolls. When NAA was sprayed with DAP, there was further reduction in shedding. This was in line with the findings of Bhatt *et al.* (1982). Among the different nutrient management practices, applications of 80: 40 : 40 or 80 : 60 : 60 kg NPK with 25 kg $ZnSO_4$/ha significantly reduced the bud shedding number and percentage compared to control (80 : 40 : 40 NPK kg/ha). The reduction of bud shedding was due to the effect of $ZnSO_4$ application.

The number of bolls shed per plant and the percentage of shedding was consistently reduced by foliar spray combination of NAA (40 ppm) + DAP (3%) with topping and there by increased the boll number per plant and seed cotton yield over other foliar spray treatmental combinations. Selvaraj *et al* (1977) reported that topping in cotton increased the number of bolls per plant. All the foliar spray combinations of CCC (40 ppm) resulted in the drastic reduction of seed cotton yield due to reduced rate of flowering and increased bud and boll shedding. Such reduced yields were reported by Gidnavar (1979) also.

Among the different nutrient management practices, application of 25 kg $ZnSO_4$ with 80 : 60 : 60 or with 80 : 40 : 40 kg NPK/ha increased the boll retention, dry matter production and seed cotton yield. Increased dry matter production with reduced bud and boll shedding percentage in these treatments compared to control, contributed to higher retention of bolls per plant. Earlier studies by Salem and Roshdy (1983) confirmed that application of $ZnSO_4$ increased the boll retention in cotton.

In conclusion, application 80 : 60 : 60 kg NPK with 25 kg $ZnSO_4$/ph and 80 : 40 : 40 kg NPK with foliar spray combination of NAA (40 PPM) + DAP (3%) and with topping increased the dry matter production, number of bolls per plant and seed cotton yield. These two treatments were comparable with the application of 80 : 40 : 40 kg NPK with 25 kg $ZnSO_4$/ha. The bud and boll shedding was consistently reduced by foliar spray combination of NAA (40 ppm) + DAP (3%) with topping at fifteenth node resulting in increased seed cotton yield.

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