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EFFECT OF POTASSIUM NAPHTHENATE ON YIELD ATTRIBUTING CHARACTERS AND SEED YIELD OF COWPEA CV. BARI FALON-1 (*VIGNA UNGUICULATA* (L.) WALP.) GROWN UNDER EARLY *RABI* SEASON

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Key words: Cowpea, *Vigna unguiculata*, Potassium napthenate, Yield attributes, Yield

Abstract

An experiment was carried out during 2001-2002 on the effect of different concentrations of potassium naphthenate (KNap), applied as foliar spray on yield and yield attributing characters of cowpea (*Vigna unguiculata* (L.) Walp.) grown in early *Rabi* season. Results indicated that the four concentrations of KNap had significaltly positive effects on almost all reproductive parameters. 1500 KNap gave higher values than three other concentrations.

Introduction

Cowpea is generally grown in Bangladesh for seeds in *Rabi* season and as fodder in *Kharif* season. Growth regulators have been found to be effective in increasing the productivity of crops (Fattah and Wort 1970, Deshai and Deore 1985, Borkar *et al*. 1991, Uddin *et al*. 1994, Gitaghosh 1996). No reports are available on the effect of potassium naphthenate on cowpea. Therefore, the present investigation was undertaken to record the yield attributes and yield of cowpea by sowing the crop at early *Rabi* season and applying different growth regulators at different concentrations. The reproductive aspects have been recorded and compared.

Materials and Methods

Field studies were conducted on research plots at Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka-1207 during 2001 - 2002. Seeds were obtained from the Regional Agricultural Research Station, Hathazari, Chittagong of Bangladesh Agricultural Research Institute. For early *Rabi* season seeds were sown on November 15, 2001 after the harvesting of *T. aman*. The soil was clay loam in texture, having low organic matter with moderate permeability and was slightly acidic. The soil had 0.09% nitrogen, 80.26 μg/g phosphorus, 0.09 meq/100 g potassium, 0.61 μg/g zinc, 9.38 μg/g soil sulphur, 0.17 μg/g boron, 0.52 μg/g copper, 13.26 μg/g iron and 8.93 μg/g manganese. In early *Rabi* season, the average temperature was 23.94°C and there was 7.91 cm of rainfall.

In this experiment, only four concentrations of potassium naphthenate (KNap) were sprayed on cultivar Bari Falon-1. KNap was prepared by combining potassium hydroxide (KOH) with naphthenic acid (Fattah 1969). Four concentrations of KNap, 500, 1000, 1500 and 2000 ppm were used.

Experiments were laid out in a randomized complete block design with three replications. The unit plot size was 5m × 4m. The land was prepared with four ploughing followed by laddering. Nitrogen, phosphorus, potassium, boron, sulphur and zinc at the rate of 20 kgN/ha, 50 kg P_2O_5/ha,

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40 kg K_2O/ha, 0.60 kg B/ha, 18 kg S/ha and 2 kg Zn/ha were applied from urea, triple super phosphate, muriate of potash, borax, gypsum and zinc sulphate fertilizers, respectively. The rates were determined as per the recommendation of BARC (1997) on the basis of the results of the initial soil analysis.

Seeds were sown maintaining row to row and plant to plant distance of 50 and 20 cm, respectively. At 45 DAS, the treatments were made by spraying respective growth regulator solutions on the foliage of the crop till drop. Three flood irrigation, during branching, flowering and pod filling stages were given.

Ten plants from each plot were pre-demarcated randomly and from those plants matured pods were harvested and counted at 105 and 120 DAS. Data on pod length was collected from ten plants at 75, 90, 105 and 120 DAS in early *Rabi* season. Number of seeds/pod, 1000 seed weight, seed weight/plant and harvest index were collected harvesting 20 matured pods at 105 and 120 DAS in early *Rabi* season. At the middle of each plot, three meter square area was demarcated and from this area, matured pods at both the seasons were harvested periodically to assess seed yield/ha.

Results and Discussion

Seeds sown in early *Rabi* season showed that the length of pods increased up to 105 DAS and thereafter remained almost constant (Table 1). In almost all the growth stages, 1500 KNap produced longest pods. The maximum number of matured pods were found at 120 DAS (Table 2). At 105 DAS, 1500 KNap produced significantly higher number of pods while at 120 DAS, both 1500 and 2000 KNap were effective in doing so.

Table 1. Effect of KNap concentrations on pod length (cm) of cowpea cv. Bari Falon -1 at different growth stages sown in early *Rabi* season.

Treatments (KNap)	Days after sowing			
	75	90	105	120
Control	7.52	10.21	11.50	11.50
500	7.61	10.35	11.85	11.89
1000	7.85	11.26	12.69	12.85
1500	7.95	12.05	14.12	14.12
2000	7.88	12.05	14.09	14.11
LSD (0.05)	0.31	0.42	0.61	0.70

Table 2. Effect of KNap concentrations on number of matured pods/plant of cowpea cv. Bari Falon-1 at different growth stages sown in early *Rabi* season.

Treatments	Days after sowing		
(KNap)	105	120	Total
Control	2.12	8.71	11.80
500	2.17	8.81	11.96
1000	2.23	9.25	12.48
1500	2.56	10.13	13.82
2000	2.40	10.09	13.61
LSD (0.05)	0.05	0.82	

Number of seeds/pod increased slightly from 105 DAS to 120 DAS (Fig. 1). 1500 and 2000 KNap produced identical and significantly more seeds than others.

Like pod length, 1000 seed weight after 105 DAS remained almost same (Fig. 2). 1500 and 2000 KNap showed significantly higher 1000 seed weight than other treatments. Seed dry weight/plant ranged from 9.01 - 11.33 g/plant at 105 and from 12.98 - 16.45 g at 120 DAS (Fig. 3). 1500 KNap at 105 DAS and 1500 - 2000 KNap at 120 DAS produced significantly higher seed weight than others.

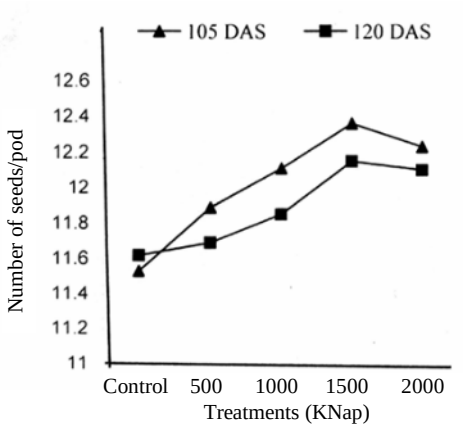

Fig. 1. Effect of KNap concentrations on number of seeds/pod of cowpea cv. Bari Falon-1 at 105 and 120 DAS sown in early *Rabi* season.

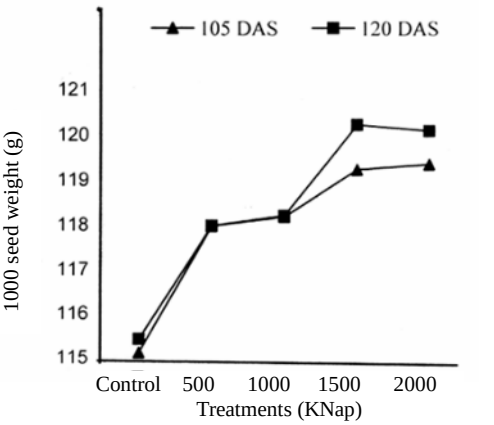

Fig. 2. Effect of KNap concentrations on 1000 seed weight (g) of cowpea cv. Bari Falon-1 at 105 and 120 DAS sown in early *Rabi* season.

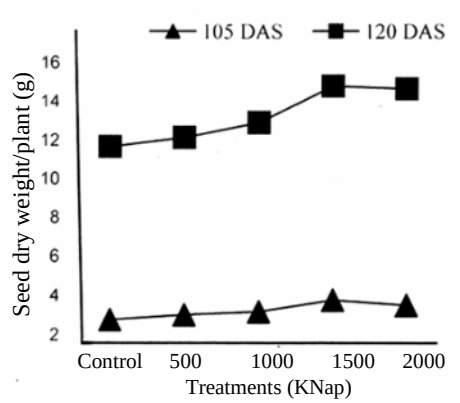

Fig. 3. Effect of KNap concentrations on seed dry weight/ plant (g) of cowpea cv. Bari Falon-1 at 105 and 120 DAS sown in early *Rabi* season.

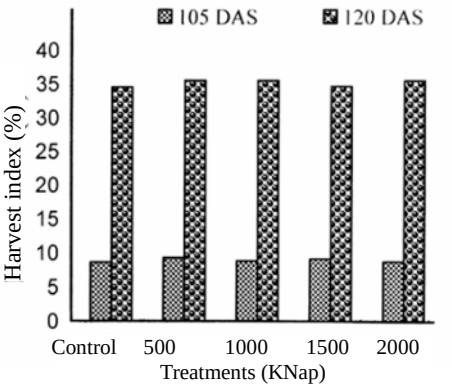

Fig. 4. Effect of KNap concentrations on harvest index of cowpea cv. Bari Falon-1 at 105 and 120 DAS sown in early *Rabi* season.

Harvest index ranged from 26.31 - 28.68 % at 105 DAS and from 38.62 - 40.47 % at 120 DAS (Fig. 4) and it decreased at higher concentrations of KNap. However, at both the stages, the treatments did not show any significant effect on harvest index (HI). Seed yield/ha ranged from 1492.87 to 1913.90 kg/ha (Table 3). 1500 KNap produced significantly higher seed yield/ha.

During this investigation in the early *Rabi* seasons, 1500 KNap proved to be superior producing higher values of almost all reproductive parameters that contributed to seed yield. Increase in yield of different leguminous crops due to application of growth regulator has also been reported previously by many workers (Fattah and Wort 1970, Fattah *et al*. 1976, Uddin *et al*. 1994, Deshi and Deore 1985, Borkar *et al*.1991). In the next paper of this series the effect of different concentrations of three growth regulators on cowpea grown in late *Rabi* season will be presented and discussed.

Table 3. Effect of KNap concentrations on seed yield/ha (kg) of cowpea cv. Bari Falon-1 at different growth stages sown in early *Rabi* season.

Treatments	Days after sowing		
(KNap)	105	120	Total
Control	289.38	1203.49	1492.87
500	313.54	1251.76	1565.30
1000	328.75	1331.11	1659.86
1500	389.12	1524.78	1913.90
2000	361.36	1510.13	1871.48
LSD (0.05)	19.99	30.16	50.15

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