Journal of Crop and Weed 7(1): 113-114 (2011)

Studies on effect of potassium fertilizer and some plant protection techniques on pest incidence of cauliflower

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Received: 26.01.2011, Revised: 28.05.2011, Accepted: 30.05.2011

ABSTRACT

Field trials are carried out for two consecutive years, 2008 and 2009 during rabi season in the adopted farmers filed in Cooch Behar district of West Bengal, India with the objective of effect of potassium fertilization and some plant protection measures on pest incidence and yield of Cauliflower, Brassica oleracea var. botrytis L. In this present study, the increment of potassium doses reduced the infestation of insect pest. Among the different doses of potassium, 50kg K_2O/ha exhibited the lowest infestation and highest yields of cauliflower. Sprinkler irrigation during evening hours reduced the adult population of lepidopteron insect which had reflected on larval population. It is appeared from the investigation that 50kg K_2O and either trap crop or sprinkler irrigation may fruitful against insect pest of cauliflower and should give best return.

Key Words: DBM, potassium doses, plant protection measure, pest incidence, cauliflower

Cauliflower, *Brassica oleracea* var. *botrytis* L. is an important vegetable crop grown in India. Cauliflower among the cole crops, is high valued for its attractive appearance, good in taste and high nutrition content. Its cultivation fetches handsome income to the grower. During cultivation cauliflower attracts many pests (Abrol and Gupta, 2010; Sachan and Gangwar, 1980) which act as limiting factor in the profitable cultivation of this crop. The major insect pests of this crop are cabbage butterfly (*Pieris brassicae*), aphid (*Lypaphis erysimi*), diamond back moth (*Plutella xylostella*), cabbage semilooper (*Trichoplusia ni*) (Bhatia and Verma, 1993; Sharma, 1998). The damaged caused by this pests is reported to be varying from 5-100% (Sachan and Gangwar, 1990). For controlling of this pest indiscriminate use of broad spectrum insecticide create problems on pesticide residues in harvest produce and adverse effect on non target species. Present studies were aimed to determine the effect of different doses of potassium and different pest management methods on insect pest control to produce higher curd yield.

MATERIALS AND METHODS

Field trials are carried out for two consecutive years, 2008 and 2009 during rabi season in the adopted farmers filed. The soils of the experimental plots are sandy loam in texture with medium content of available P, K and high in N and raw humus.

Cauliflower seeds (var. Pusa Katki) were sown in the nursery and one month old seedlings were transplanted in 3 x 3m^2 plots. The row to row and plant to plant distance was kept as 60cm and 45cm respectively.

Nitrogen as urea and phosphorus SSP were applied @60 kg ha^{-1} and 40kg ha^{-1} respectively. Potassium was used in the form of K_2O (MOP) according to treatment (K_0 : 0kg ha^{-1}; K_1 : 30kg ha^{-1}; K_2 : 35kg ha^{-1}; K_3 : 40kg ha^{-1}; K_4 : 45kg ha^{-1} and K_5 : 50 kg ha^{-1}) before transplanting of seedling. No plant protection measures were taken to allow insect pests infestation naturally. Insect population from ten plants of each plots were recorded at weekly interval from the day of appearance of the insect pests, total population per plant was taken into account. The experiment was laid out in a single factor RBD design with three replications.

Another experiment was conducted to find the effective plant protection measures. In this experiment, altogether four treatments (T_0 : Negative Control, T_1 : Trap Crop, T_2 : Sprinkler Irrigation and T_3 : Imidachloprid, T_4 : Positive Control (with recommended dose of fertilizer) were taken into account. Proper agronomic practices and recommended fertilizer dose (NPK – 60:40:40 kg ha^{-1}) were applied in the field. In this experiment for T_1 two guard rows of pigeon pea were maintained in the plots, for T_2 irrigations (total No. 5) were done during evening hours and for T_3 three foliar sprays of imidachloprid @0.5g 4 litres of water were done 1st at 15 days after transplanting and followed by 20 days interval. This experiment was also fabricated in single factor Randomized Block Design with three replications. Data thus obtained were subjected to statistical analysis for better interpretation of results (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Significant variation was observed among the potassium treatment. Highest Aphid population was found in K_0 (32 plant^{-1}). Larval population of DBM was found highest from K_0 (1.25 plant^{-1}) significantly among the treatments. Highest number of larva (cabbage butterfly) (4.5 plant^{-1}) was found in the plots without potassium (K_0) and lowest (2.00/plant) was recorded from both K_4 and K_5. Larval population of cabbage semilooper was found highest (3.50 plant^{-1}) from K_0 and lowest (2.00 plant^{-1}) was reported from K_5. Highest curd yield (26t ha^{-1}) was obtained from K_5 plots and lowest(12t ha^{-1}) from K_0.

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From table 2, it was found that highest aphid population was recorded from T_0 (20 plant $^{-1}$) and lowest was from T_3 (5 plant $^{-1}$). Significantly highest population of DBM (0.50 plant $^{-1}$) was found from T_0 and lowest was recorded from T_3 (0.10 plant $^{-1}$). Population of cabbage butterfly was recorded highest from T_3 (0.10 plant $^{-1}$). Population of cabbage butterfly was recorded highest from T_0 (3.00 plant $^{-1}$) and lowest was from both T_2 and T_4 (01 plant $^{-1}$). Semilooper population was found highest from T_1 (2.50 plant ^{1}) and lowest was recorded from both T_2 and T_3 (0.50 plant $^{-1}$). In this experiment highest yield was found from T_2 and T_3 and lowest was from T_0 (26t ha^{-1} and 24t ha^{-1} respectively).

Among the plant nutrients, potassium is known to increase the plant resistance to various pests and disease (Tamhane *et al.*, 1978). In this present study found that with the increment of potassium doses infestation of insect pest were reduced. Earlier report of Nachiappan and Veeraval (1985) supports this view that reported potassium in the plant also reduces the population of sucking insects and was to be positively correlated with lowest insect numbers. Among the different doses of potassium 50kg K_2O/ha exhibited the lowest infestation and highest yields. This type of results was found by earlier workers, in rice crop on gall fly (Israel and Prakash Rao, 1967) and Singh *et al.* (1997) in mustard on aphid. Better protection of cauliflower insect pest by the application of higher potassium doses was most probably due to the accumulation of defensive phenolics and their compounds in the plant body (Vaithilingam and Baskaran, 1985). Sprikler irrigation during evening hours reduces the population of lepidopteron insect. From the above discussion it may conclude that 50kg K_2O and either trap crop or sprinkler irrigation may fruitful against insect pest of cauliflower and give best return.

Table 1: Insect pest population (per plant) and yield of cauliflower with potassium treatments

Treatments	Aphid plant^{-1}	DBM plant^{-1}	Cabbage butterfly plant^{-1}	Cabbage semilooper plant^{-1}	Yield (t ha^{-1})
K_1= 30 kg K_2O ha^{-1}	25.00	1.00	4.00	3.00	22.00
K_2 = 35 kg K_2O ha^{-1}	24.00	0.75	3.00	3.00	24.00
K_3 = 40 kg K_2O ha^{-1}	20.00	0.50	3.00	2.50	24.00
K_4 = 45 kg K_2O ha^{-1}	18.00	0.50	2.00	2.50	25.00
K_5 = 50 kg K_2O ha^{-1}	15.00	0.40	2.00	2.00	26.00
K_0 = 0 kg K_2O ha^{-1}	32.00	1.25	4.50	3.50	12.00
SEm(±)	**0.11**	**0.14**	**0.11**	**0.19**	**0.53**
LSD(0.05)	**0.34**	**0.43**	**0.32**	**0.56**	**1.53**

Table 2: Effect of treatments on insect pest population plant^{-1} and yield of cauliflower

Treatments	Aphid plant^{-1}	DBM plant^{-1}	Cabbage butterfly plant^{-1}	Cabbage semilooper plant^{-1}	Yield (t ha^{-1})
T_1: Trap Crop	10.00	0.30	3.00	0.50	25.00
T_2: Sprinkler irrigation	15.00	0.20	2.00	0.10	26.00
T_3: Imidachloprid	05.00	0.10	1.00	0.50	26.00
T_4: Recommended dose of fertilizer	20.00	0.50	3.00	2.50	24.00
SEm(±)	0.17	0.09	0.14	0.06	0.52
LSD(0.05)	0.51	0.28	0.42	0.19	1.54

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