EFFECT OF DIFFERENT LEVELS OF POTASH ON INCIDENCE OF SUCKING PESTS IN BRINJAL

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ABSTRACT

An experiment was conducted at main Vegetable Research Station, Anand Agricultural University, Anand during *rabi* 2010-11, to study the effect of different levels of potash on incidence on sucking pests in brinjal (GBH 1). The effect of potash was evaluated based on number of sucking pests per leaf and fruit yield. The highest level of potash (80 kg/ha) recorded significantly lower aphid population (2.81 aphids per leaf) than the rest of the treatments except 70 kg/ha (2.89 aphids per leaf), with which it was at par. Similarly, the highest level (80 kg/ha) reduced the jassid population significantly lower (1.90 jassid per leaf) than rest of the treatments, except 70 kg/ha (2.09 jassid per leaf) with which it was at par. With respect to white fly population, two higher levels (80 kg/ha and 70 kg/ha) recorded significantly lower whitefly population (1.96 white fly per leaf and 2.09 white fly per leaf, respectively) than the rest of the treatments and both were at par with each other. The highest level of potash (80 kg/ha) yielded significantly higher fruit yield (360.49 q/ha) than its two lower levels (40 kg/ha and 50 kg/ha), while it was at par with its second higher and middle levels (70 kg/ha and 60 kg/ha). The lowest level (40 kg/ha) registered significantly lower yield as compared to two higher levels (80 and 70 kg/ha), whereas it was at par with K_2O @ 50 kg/ha and 60 kg/ha. Overall, it is observed that as the level of potash increased, the population of sucking pests reduced and the fruit yield increased.

KEY WORDS: Brinjal, sucking pests, potash, fruit yield

INTRODUCTION

Brinjal (*Solanum melongena* L.) is known as a "King of Vegetables" originated in India, where a wide range of wild types and land races occurs. In world, the production of brinjal is about 4.18 crore metric tons. India is the second largest producer of brinjal after China (Anon., 2010a). In India, the crop is extensively cultivated in about 5.7 lakh hectares with a production of 96 lakh tonnes. In Gujarat, it is cultivated in 0.65 lakh hectares with an annual production of 11.44 lakh tonnes and a productivity of 17.37 tonnes per hectare (Anon., 2010b). The brinjal is a staple food consumed as a green vegetable in diets by most of the people. According to Shanmugavelu (1989), edible fruits of brinjal contain 92.7 per cent water, 1.1 per cent protein,

0.02 per cent fat, 0.54 per cent ash and 5.5 per cent carbohydrates. It contains vitamins A, B, C and also rich in minerals like iron, phosphorus and calcium. The white brinjal is said to be for diabetic patients under ayurvedic medicines (Chandrakumar *et al.*, 2008).

Brinjal crop suffers severely by various insect pests, which reduces its fruit yield and quality. In India, the crop is damaged by more than 30 insect pests obtaining from nursery stage (Regupathy *et al.*, 1997). Of which jassid, *Amrasca biguttula biguttula* (Ishida); whitefly, *Bemisia tabaci* Gennadius and aphid, *Aphis gossypii* Glover, are the major and important sucking pests. Both nymphs and adults of these important sucking pests occurs regularly on the crop from the early stage and remains till to the harvest of the crop causing enormous damage by sucking cell sap from the leaves and tender plant parts. Due to aphid infestation under surface of the leaves get crinkled and slightly curled backwards. The vitality of the plant is diminished and the plants turn yellow, get deformed and dry away. The nymphs and adults of jassid inject their toxic saliva while feeding and as a result, the plant becomes stunted, the leaves crinkle, turn yellowish and become cup shaped. Brownish or reddish colour may develop along the edges of the leaves. Due to whitefly infestation leaves become wrinkled, curled downwards and ultimately shed. Besides the feeding damage, aphids and whitefly also exude honeydew, which favours the development of sooty mould. In case of severe infestation, this black coating is so heavy that it interferes with the photosynthetic activity of the plant resulting in stunted growth. Fertilizers provide plants to more nutrients (Bentz *et al.*, 1995), as a result of which the plants not only get lush green colour, but also enhance the accumulations of nutrients, which attracts phytophagous insects (Natarajan, 1986). By adjusting proper doses, phytophagous insects could be controlled which can be used as a good tool in the IPM programme.

The information regarding impact of different levels of potash on incidence of sucking pests is lacking. Hence, a field experiment was conducted to study the impact of different levels of potash on incidence of sucking pests in brinjal (GBH-1) at Main Vegetable Research Station, Anand Agricultural University, Anand during *rabi* 2010-11.

MATERIALS AND METHODS

Brinjal crop was transplanted during last week of September and raised by adopting recommended agronomical practices. Different 5 doses (40, 50, 60, 70 and 80 kg/ha) of potash were evaluated in Randomized Block Design replicated 3 times in the plot size of 4.2 m x 3.6 m with spacing of 90 cm x 60 cm. The respective dose of potash was applied as per the treatment at the time of transplanting, whereas recommended dose of nitrogen and phosphorous were applied in all the plots as recommended. For recording observations, five plants were selected randomly in each net plot area and the observations on sucking pests *viz.*, aphid, jassid and whitefly were recorded from three (one from top, middle and bottom) leaves of same 5 selected plants. The observations were made at weekly interval starting from the one week after transplanting till to the harvesting of the crop. The whole experimental plot was kept free from any insecticide application. The fruit yield was recorded picking wise from each net plot. The data obtained on sucking pest population were analysed after transforming them in to square root, while the fruit yield data were analysed without any transformation.

RESULTS AND DISCUSSION

The effect of potash was evaluated based on number of sucking pests per leaf and fruit yield (Table 1). It was noticed from the data that effect of various levels of potash on sucking pests, *viz.*, aphid, jassid and whitefly (Table 1 and Figure 1) was dose dependent. All the levels of potash reduced the sucking pests (aphid, jassid and whitefly) infestation, when compared with control. The highest level of potash (80 kg/ha) recorded significantly lower aphid population (2.81 aphids per leaf) than the rest of the treatments except 70 kg/ha (2.89 aphids per leaf), with which it was at par. K_2O @ 50 kg/ha was at par with K_2O @ 60 kg/ha on one hand and with K_2O @ 40 kg/ha on another hand of chronological order.

Similar type of result was observed for jassid population also (Table 1 and Figure 1). The highest level (80 kg/ha) reduced the jassid population significantly lower (1.90 jassid per leaf) than rest of the treatments, except 70 kg/ha (2.09 jassid per leaf) with which it was at par. K_2O @ 60 kg/ha found more effective as compared to lowest level (40 kg/ha), but was at par with K_2O @ 70 kg/ha on one hand and with K_2O @ 50 kg/ha on another hand of chronological order. The lowest level (40 kg/ha) of potash did not significantly differed from control.

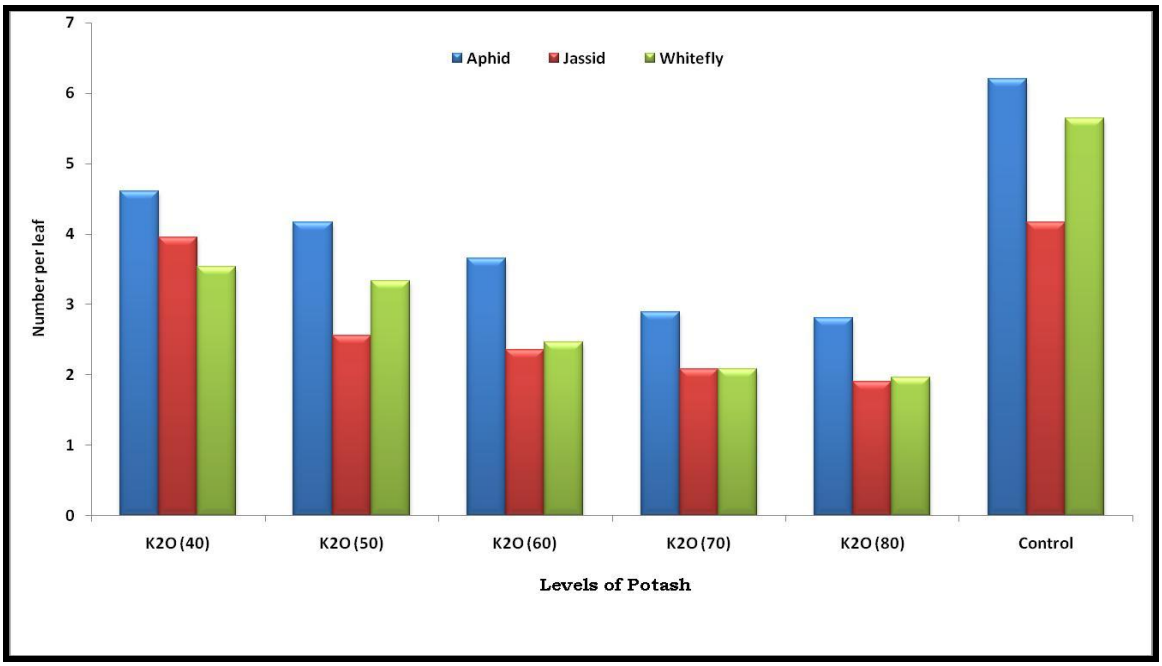

Fig. 1: Impact of different levels of potash against sucking pests in brinjal

With respect to white fly population (Table 1 and Figure 1), two higher levels (80 kg/ha and 70 kg/ha) recorded significantly lower whitefly population (1.96 white fly per leaf and 2.09 white fly per leaf, respectively) than the rest of the treatments and both were at par with each other. K_2O @ 60 kg/ha found significantly more effective with respect to reduce the incidence of white fly population as compared to two lower levels (40 and 50 kg/ha). The latter two levels were at par with each other.

As far as brinjal fruit yield (Table 1 and Figure 2) concerned, all the levels of potash yielded significantly more fruit yield when compared with control. The highest level of potash (80 kg/ha) yielded significantly higher fruit yield (360.49 q/ha) than its two lower levels (40 kg/ha and 50 kg/ha), while it was at par with its second higher and middle levels (70 kg/ha and 60 kg/ha). The lowest level (40 kg/ha) registered significantly lower yield as compared to two higher levels (80 and 70 kg/ha), whereas it was at par with K_2O @ 50 kg/ha and 60 kg/ha.

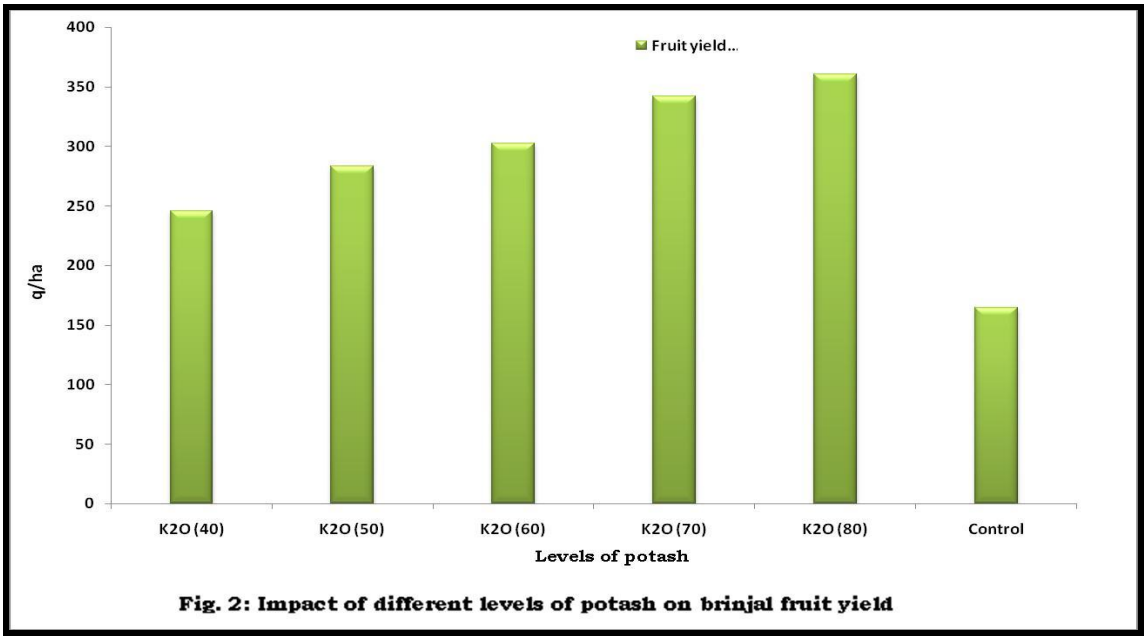

Fig. 2: Impact of different levels of potash on brinjal fruit yield

Overall, it is observed that as the level of potash increased, the population of sucking pests reduced and the fruit yield increased. The highest level of potash (80 kg/ha) had lower population of sucking pests and yielded higher brinjal fruits. The increased level of potassium fertilizers generally appeared to have a negative influence on pest population. This might be due to a higher proteogenesis in plants, a physiological phenomenon correlated with the elimination of amino acids and reducing sugars in the sap, which otherwise favour the development of sap feeders.

It was indicative from the available literature that works on effect of potashic fertilizers on sucking pests infesting brinjal is very scanty. According to Sudhakar *et al.* (1998), application of higher doses of potash significantly reduced the sucking pest population in brinjal. Godase and Patel (2001) noticed significantly lower jassid population and longer nymph development period of 11.41 days with growth index of 5.26 in the treatment of double dose of K (75 kg/ha). Sudoi *et al.* (2001) reported that the level of leaf potassium reduced significantly leaf nutrient content. The depressed potassium uptake in leaves could also influence tolerance by the tea plant to certain environmental stresses, including susceptibility to pest attack. Patil (2005) also found that increase in level of potassium reduced the mite population incidence in brinjal. Thus, the above reports strongly supported the results of present investigation. However, Thakre *et al. (*2005*)* reported that increasing the level of K did not show any significant effect on fresh brinjal

fruit yield. In present investigation, as the levels of potash increased, the fruit yield also increased. So, above report is not telly with present findings. It might be due to only two levels of potash (25 and 50 kg/ha) were tested by scientists.

CONCLUSION

The highest level (80 kg/ha) of potash significantly reduced aphid and jassid population than its three lower levels (40, 50 and 60 kg/ha). However, two higher levels (80 and 70 kg/ha) recorded significantly lower whitefly population and both were at par with each other. The highest level (80 kg/ha) yielded significantly higher fruit yield than its two lower levels (40 and 50 kg/ha).

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Table 1: Impact of different levels of potash on incidence of sucking pests and brinjal fruit yield

Treatments (Kg/ha)	Number of Sucking Pests Per Leaf			Fruit Yield (q/ha)
	Aphid	Jassid	Whitefly	
1	2	3	4	5
K_2O (40)	2.26^{c} (4.61)	2.11^{d} (3.95)	2.01^{c} (3.54)	245.68^{c}
K_2O (50)	2.16^{bc} (4.17)	1.75^{c} (2.56)	1.96^{c} (3.34)	283.64^{bc}
K_2O (60)	2.04^{b} (3.66)	1.69^{bc} (2.36)	1.72^{b} (2.46)	302.78^{abc}
K_2O (70)	1.84^{a} (2.89)	1.61^{ab} (2.09)	1.61^{a} (2.09)	341.98^{ab}
K_2O (80)	1.82^{a} (2.81)	1.55^{a} (1.90)	1.57^{a} (1.96)	360.49^{a}
Control	2.59^{d} (6.21)	2.16^{d} (4.17)	2.48^{d} (5.65)	164.20^{d}
ANOVA				
S. Em. ± :Treatments (T)	0.05	0.03	0.03	25.20
Period (P)	0.09	0.04	0.03	-
T x P	0.23	0.11	0.07	-
C. D. at 5%: Treatments(T)	0.15	0.08	0.08	75.95
Period (P)	0.26	0.12	0.09	-
T x P	NS	NS	0.21	-
C. V. (%)	21.61	13.20	13.14	17.80

Notes:

1. *Treatment means with letter(s) in common are not significant at 5 % level of significance in respective column*

2. *Figures in parentheses are retransformed values; those outside are* $\sqrt{X+0.5}$ ** transformed values*

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