International Journal of Farm Sciences **6(1)** : 61-65, 2016

Effect of biofertilizer, liquid bio-manure, organic nutrients, polymorphic growth hormones and multi-micronutrients on yield attributes of mung bean under custard apple-based agri-horti system

P TIWARI, RP SINGH, RANJEET SINGH* and SANJIV SUMAN

Department of Agronomy, IAS, Banaras Hindu University, Varanasi 221003 UP, India
***Department of Silviculture and Agroforestry**
Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan 173 230 HP, India
Email for correpsondence: prabhatbhu033@gmail.com

ABSTRACT

An experiment was conducted in Kharif season of 2013 to study the effect of biofertilizer, liquid bio-manure, organic nutrients, polymorphic growth hormones and multi-micronutrients on yield attributes of mung bean under custard apple-based agri-horti system. The treatments were composed of thirteen combinations tested in a randomized block design. The yield attributes viz number of pods per plant, number of seeds per pod, test weight, seed yield and stover yield were found highest in Bioplantomin (liquid bio-manure) applied at 3.5 l/ha as foliar spray and lowest in control treatment.

Keywords: Yield; mung bean; custard apple, agri-horti system

INTRODUCTION

Agri-horti system has emerged as a viable option for achieving land cover on one hand and to fulfill the increasing demand of food grains and fodder to human and livestock on the other hand. It is an improved indigenous cropping system which fully utilizes the growing season and markedly increases the return per unit area per unit time. Tree-based cropping system has proved to be very successful in areas receiving less than 1000 mm rainfall with nine months of dry season (Singh et al 1987).

Custard apple, *Annona squamosa* L is distributed throughout the tropics and is pre-eminently a desert fruit normally eaten as fresh. The vitamin C content in it is appreciable (35-42 mg/100 g) and slightly higher than the grape fruit. Its nutrient value of thiamine, potassium and dietary fibre is also significant. Green fruits, seeds and leaves have effective vermicidal and insecticidal properties.

Mung bean is one of the most important pulse crops for protein supplement in subtropical zones of the

world. It is widely grown in Indian subcontinent as a short duration catch crop between two principal crops (Afzal et al 2008). It is becoming an important crop as it is the best alternative to meet the food needs of the large population of developing countries due to its nutritional superiority and nitrogen fixing characters (Raza et al 2012). Mung bean can play the major role in national economy of India due to its wider adaptability, easy digestibility, better palatability and higher market price.

Plant growth regulators (PGRs) are known to improve physiological efficiency including photosynthetic ability of plants and offer a significant role in realizing higher crop yields. Hence there is a need to study the effect of biofertilizers, plant hormones, various organic nutrients, polymorphic growth hormones and multi-micronutrients on yield attribute of mung bean under custard apple-based agri-horti system to boost up the productivity. With this background the present investigation was undertaken to find out the of biofertilizer, liquid bio-manure, organic nutrients, polymorphic growth hormones and multi-micronutrients on yield attributes of mung bean under custard apple-based agri-horti system.

MATERIAL and METHODS

The experiment was carried out at the agronomy farm of Rajiv Gandhi South Campus, Brakachha, BHU, Mirzapur which is situated in Vindhyan region of district Mirzapur (25º 10' latitude, 82º 37' longitude and altitude of 427 meters amsl) occupying over an area of more than 1000 ha where variety of agricultural, horticultural, medicinal and aromatic crops are grown. Vindhyan soil comes under rainfed and invariably has poor fertility status. This region comes under agro-climatic zone IIIA (semi-arid eastern plain zone). Maximum temperature in summer is as high as 44.65°C and minimum temperature in winter falls below 8.12°C. The average annual rainfall of locality is 1100 mm of which nearly 90 per cent is contributed by southwest monsoon between July and September. The total rainfall during the crop season 2012-13 was 1207.4 mm; maximum and minimum temperature was 38.7 and 16ºC and maximum and lowest relative humidity was 90 and 33 per cent respectively. The experiment was conducted in randomized block design with 13 treatments replicated thrice as given in Table 1.

Recommended intercultural operations were practiced. The biometric observations on growth attributes were recorded at an interval of 15 days viz 15th, 30th and 45th days after sowing and at maturity. Yield attributes viz number of pods per plant, number of seeds per pod, test weight, seed yield and stover yield were measured.

Table 1. Details of treatments

Code	Treatment	Quantity	Application
T_1	Harit Vardan (biofertilizer)	3.5 kg/ha	Soil treatment
T_2	Harit Vardan (biofertilizer)	5.5 kg/ha	Soil treatment
T_3	Harit Vardan (biofertilizer)	7.5 kg/ha	Soil treatment
T_4	Bioplantomin (liquid bio-manure)	1.5 l/ha	Foliar spray
T_5	Bioplantomin (liquid bio-manure)	2.5 l/ha	Foliar spray
T_6	Bioplantomin (liquid bio-manure)	3.5 l/ha	Foliar spray
T_7	Biovita (organic product)	0.4 l/ha	Foliar spray
T_8	Biovita (organic product)	0.6 l/ha	Foliar spray
T_9	Biovita (organic product)	0.8 l/ha	Foliar spray
T_{10}	Farm Bahar (polymorphic growth hormone)	2.0 ml/l	Seed treatment
T_{11}	Farm Bahar (polymorphic growth hormone)	2.0 ml/l	Seed treatment + foliar spray
T_{12}	Plantgro (multi-micronutrients)	4.0 g/l	Foliar spray
T_{13}	Control	-	-

RESULTS and DISCUSSIONS

Effect of biofertilizer, liquid bio-manure, organic nutrient, polymorphic growth hormone and multi-micronutrient on yield attributes (Table 2)

Number of pods per plant: Maximum number of pods per plant (19.26) was obtained when T_6 (Bioplantomin- liquid bio-manure) was applied at 3.5 l/ha as foliar spray followed by T_{12} (Plantgro- multi-micronutrient) applied at 4.0 g/l as foliar spray (18.27) as against minimum number of pods per plant (8.40) in control. Arora et al (1998) also reported that the application of Cycocel at 50 per cent flowering stage enhanced number of pods in chickpea.

Pod length (cm): Maximum pod length (9.60 cm) was recorded in T_6 (Bioplantomin- liquid bio-manure) as foliar spray followed by T_{12} (Plantgro- multi-micronutrient) applied at 4.0 g/l as foliar spray (9.16) and minimum in control (7.36). Similar results were obtained by Rana et al (2011).

Grain yield: Grain yield was significantly affected by different treatment combinations. The highest grain yield (1034.76 kg/ha) was obtained in case of T_6 (Bioplantomin- liquid bio-manure) when applied at 3.5 l/ha as foliar spray followed by T_{12} (Plantgro- multi-micronutrient) applied at 4.0 g/l as foliar spray (1014.61 kg/ha) and the minimum grain yield (580.63 kg/ha) was observed in control. Similar results were also reported in mung bean by Mehta (1995).

Test weight

Highest test weight (37.57 g) was found with the application of T_6 (Bioplantomin- liquid bio-manure) when

Table 2. Effect of biofertilizer, liquid bio-manure, organic nutrient, polymorphic growth hormone and multi-micronutrient on yield attributes of mung bean at harvest

Treatment	# pods/plant	Pod length (cm)	Grain yield (kg/ha)	Test weight (g)	Stover yield (kg/ha)
T_1	11.00	7.56	589.31	32.84	2022.10
T_2	11.93	7.79	624.83	33.70	2053.47
T_3	12.36	8.03	714.30	34.28	2123.68
T_4	12.80	8.26	809.70	34.39	2194.26
T_5	18.13	9.00	987.43	36.60	2511.93
T_6	19.26	9.60	1034.76	37.57	2572
T_7	11.33	7.60	601.27	33.14	2028.93
T_8	12.06	7.90	669.27	34.00	2094.83
T_9	13.70	8.40	837.06	34.85	2243.62
T_{10}	15.66	8.66	871.21	35.49	2253.74
T_{11}	16.80	8.73	957.13	35.74	2461.06
T_{12}	18.27	9.16	1014.61	36.90	2550.86
T_{13}	8.40	7.36	580.63	32.20	1986.78
SEm±	0.15	0.07	26.75	0.04	25.02
$CD_{0.05}$	0.45	0.21	78.10	0.10	73.04

applied at 3.5 l/ha as foliar spray followed by 36.90 g in T_{12} (Plantgro- multi-micronutrient) applied at 4.0 g/l as foliar spray. Lowest test weight (32.30 g) was recorded in control. These result are in agreement with Das and Prasad (2004).

Stover yield: Highest stover yield (2572 kg/ha) was found with the application of (Bioplantomin- liquid bio-manure) when applied at 3.5 l/ha as foliar spray followed by 2550.86 kg/ha in T_{12} (Plantgro- multi-micronutrient) applied at 4.0 g/l as foliar spray. Lowest stover yield (1986.26 kg/ha) was recorded in control. Similar observations were also reported by Islam et al (2010) with the application of GA_3 and IAA in black gram.

Effect on growth parameters of custard apple

Statistically non-significant differences among different treatments on growth parameters of custard apple viz tree height (m), canopy diameter (m), stem girth (cm) and shading (m) were recorded. This might be due to shorter growth phase of mung bean which could not realize the noticeable changes in the limited observation period.

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Received: 25.3.2015 ***Accepted: 13.6.2015***