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Effect of Date of Sowing and Leaf Mulching on Growth Attributes of Mung Bean under Custard Apple (*Annona squamosa* L.) Based Agri-Horti System

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ABSTRACT

A field study was carried out to evaluate the effects of date of sowing (24 July, 4 August, 14 August and 24 August) and leaf mulching (0 ton ha^{-1} and 5 ton ha^{-1}) on growth of mungbean in Factorial Randomized Block Design replicated thrice. The growth attributed as plant height, number of trifoliate leaf/plant number of nodule/plant dry matter accumulation /plant were found significantly higher on 4 August sowing as comparison to other dates of sowing. All the growth attributes found significantly higher with the application of mulch 5 t/ha over o t/ha. The interaction of sowing on 4 August and application of 5 t/ha mulch were found more over other treatments in dry matter /plant and no. of nodule /plant. In nutshell, sowing on 4 August along with the application of 5 ton mulch/ha in mungbean was found good under custard apple based agri-horti system in *Vindhyan* region.

Keywords Mungbean, Sowing date, Leaf mulching, Growth attributes.

INTRODUCTION

Mungbean [*Vigna radiata* (L.) Wilczek] is an important pulse crop of *kharif* season in India. The crop is highly sensitive to environment. Therefore, time of sowing shows remarkable influence on the growth of mungbean in *kharif* due to rainy season (Brar *et al.* 1988). Too early sowing may result in poor plant stand. Optimum time of sowing of mungbean may vary from variety to variety and season to season due to variation in agroecological conditions. Therefore, there must be a specific sowing date to obtain maximum growth. Too early sowing may not successfully germinate, while growth from too late sown crop may be low due to unfavorable condition for growth and development of mungbean (Hossain *et al.* 2009).

Leaf mulching is done for various reasons but water conservation and erosion control are the most important. Mulching is an effective way to reduce evaporation losses. It is estimated that about 60 to 75% of the rainfall is lost through evaporation. These evaporation losses can be reduced by applying mulches. This improves root growth, increases the infiltration of water, and also improves the water holding capacity of the soil. Application of leaf biomass

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enriches the native soil fertility.

MATERIALS AND METHODS

The experiment was carried out at the Agroforestry block of Agronomy farm of Rajiv Gandhi South Campus, Barkachha Mirzapur (BHU) which is situated in *Vindhyan* region (25º10' latitude, 82º37' longitude and altitude of 147 meters above mean sea level) occupying over an area of more than 1000 ha where variety of crops like agricultural, horticultural, medicinal and aromatic plants are grown. *Vindhyan* soil comes under rainfed and invariably poor fertility status catagory. This region comes under agro-climatic zone III A (semi-arid eastern plain zone).

The field experiment was laid out during *kharif* season in seven years old custard apple which was planted at a spacing of 5 m × 5 m. Green gram was sown as an intercrop. The experiment was conducted in Factorial Randomized Block Design and was comprised of the following treatments D_1 =24 July, D_2 = 4 August, D_3 = 14 August, D_4= 24 August and M_0 = 0 t mulch h^{-1} and M_1 = 5 t mulch. A basal dose of fertilizer 20 kg N and 40 kg P_2O_5 ha^{-1} and 40 kg K_2O was side drilled immediately after seeding.

All other practices were kept normal in all plots as per recommendations. By thinning plant to plant distance was kept at about 10 cm. At maturity, plant height, number of nodules, number of leaf and dry matter were recorded by following the standard procedures. Analysis of variance technique was employed to analyze the data. Differences among the treatment means were compared using least significant difference (LSD) at 5% probability level (Steel and Torrie 1984).

RESULTS AND DISCUSSION

Effect of date of sowing

Comparatively higher values of growth attributes viz. ,plant height, number of trifoliate leaf $plant^{-1}$, number of nodule $plant^{-1}$ and dry matter accumulation $plant^{-1}$ were recorded on 4 August than 14 August and 24 August sowing Table 1. Similar results were also obtained by Singh *et al.* (2012). However, reduced growth parameters found due to heavy and continuous more rainfall at early stage. Sowing of 4 August crop remained in the field for relatively longer period and accumulated more photosynthesis.

Table 1. Effect of date of sowing and leaf mulching on growth attributes of mungbean under custard apple based agri-horti system.

Treatments	Growth attributes			
	Plant height at harvest (cm)	Number of trifoliate leaf $plant^{-1}$	Number of nodule $plant^{-1}$	Dry matter $Plant^{-1}$ (g)
Date of sowing				
24 July	43.9	5.2	6.8	6.50
04 August	53.6	3.5	10.3	10.01
14 August	39.2	1.4	2.6	7.50
24 August	28.5	0.5	1.8	3.05
SEm±	1.8	0.2	0.74	0.24
CD (0.05)	5.5	0.6	2.25	0.74
Leaf mulching				
0 t/ha	36.8	2.3	3.8	5.92
5 t/ha	45.8	3.0	6.97	7.59
SEm±	2.5	0.3	1.05	0.34
CD (0.05)	7.8	NS	3.18	1.05
D × M interaction	NS	NS	S	S

Response to sowing dates also revealed significantly higher accumulation of dry matter $plant^{-1}$ in 4 august sowing than other dates of sowing. The reason for more dry matter accumulation in 04 august sowing was more accumulation of photosynthesis due to increased number of trifoliate leaf $plant^{-1}$ that contributed towards more photosynthesis. Other dates viz., 14 August and 24 August which were sown late could not accumulate sufficient dry matter because of lesser vegetative period. This might have affected adversely the production of photosynthates. Increasing trend in growth parameters viz., plant height and dry matter accumulation, up to maturity in early sowings (24 July and 4 August) and decreasing trend in late sowings (14 August and 24 August) (Singh *et al.* 2012) might be due to enhanced leaf shedding due to high temperature and less water availability.

Effect of leaf mulching

Data revealed (Table 1) that growth attributes of crop

Table 2. Interaction between date of sowing and leaf mulching for number of nodule plant^{-1} on mungbean under custard apple based agri-horti system.

Treatments		Date of sowing			
		24 July	04 August	14 August	24 August
Leaf Mulching	0 t/ha	6.20	5.87	1.87	1.47
	5 t/ha	7.40	14.87	3.47	2.13
SEm±		1.48			
CD (0.05)		4.50			

such as plant height, number of trifoliate leaf plant^{-1} number of nodule plant^{-1} and dry matter accumulation plant^{-1} had significant variation under mulches. The growth attributes had higher values with 5 t/ha mulches compared to 0 t/ha mulch (no mulching). Enhanced growth parameters in 5 t/ha mulching might be due to addition of organic matter turned into humus and resultantly into increased nutrient retention capacity of the soil by increasing effective cation exchange capacity. Also the fact that mulch covers the soil thereby reducing the rate of water removal from the soil surface to the atmosphere i.e. evaporation. Its also protect the soil and its organic content from direct content with warm air thus increasing soil microbial activity consequently encouraging decomposition is probably the reason for high growth. Similar findings were also made by Sale (2013), Vanlalhluna and Sahoo (2011) and Liasu *et al.* (2007).

Dry matter (Table 1) accumulation increased with use of 5 t/ha mulch. This influence of treatment may be attributed increased the beneficial effects on production due to mulch. The similar reasons were also proposed by Sale (2013).

The interaction (Table 2) between date of sowing and leaf mulching for number of nodule plant^{-1} found significant difference only at 4 August sowing between both the dosage of mulch. Remaining dates were found non-significant.

Table 3. Interaction between date of sowing and leaf mulching for dry matter plant^{-1} on mungbean under custard apple based agri-horti system.

Treatments		Date of sowing			
		24 July	04 August	14 August	24 August
Leaf Mulching	0 t/ha	6.33	8.53	5.38	2.97
	5 t/ha	6.67	11.50	9.06	3.13
SEm±		0.49			
CD (0.05)		1.49			

Interaction between date of sowing and leaf mulching for dry matter plant^{-1} did (Table 3) not produced significant difference at 24 July sowing between both the dosages of mulch. Later on 4 August sowing produced significantly highest dry matter plant^{-1} followed by 14 August. Finally this difference was also non significant at 24 August sowing.

CONCLUSION

In nutshell on the basis of experimental data, the following conclusions may be drawn : The date of sowing of 4 August was found optimum as compared to other date of sowing (24 July, 14 August and 24 August) in mungbean under custard apple based agri-horti system of *Vindhyan* region. Leaf mulching 5 t ha^{-1} is more beneficial for higher growth over no mulching in mungbean under custard apple based agri-horti system.

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