**Evaluation of Weed Management Practices on Growth and Yield Parameters of Mungbean [*Vigna radiata* (L.) Wilczek]**

**Abstract**

A field experiment was conducted at Research farm of School of Agriculture, Suresh Gyan Vihar University, Jaipur (Rajasthan) during *kharif* 2023 on sandy loam soil, which consisted 10 treatments and replicated thrice in randomized block design. The variety **“RMG-975”** was used for experiment. Results clearly showed that treatment (T9) *i.e.* weed free plot significantly increased plant height (61.91 cm), dry matter accumulation (259.55 g plant-1), number of branches plant-1 (10.76), number of nodules plant-1 (35.02) at harvest, number of pods plant-1 (13.89), number of seeds pod-1 (7.49), seed (1308 kg/ha), straw (2307 kg/ha) and biological yield (3615 kg/ha) over weedy check and rest of the treatments. However, plant population and test weight of mungbean was remained non significant under different weed management practices.

**Keywords:** Mungbean, Weeds, Herbicide, Hand weeding.

**Introduction**

“Pulses stand a strategic position in the agriculture economy of our country. They contain high percentage of quality protein three times more than cereals. Pulses contain vitamin B, minerals and also contain a certain quality fiber, which is desirable in human diet because of medical consideration” (Polak *et al*. 2015). “Pulse crops enrich the soil through symbiotic nitrogen fixation from atmosphere. Besides being a rich source of protein, they maintain soil fertility through biological nitrogen fixation in soil and thus, play a vital role in sustainable agriculture. Mungbean is one of the most important pulse crops and an excellent source of high-quality protein. India alone accounts for 65% of its world acreage and 54% of the total production” (Rojh *et al*. 2024). “Due to short duration nature, it is an excellent crop to fit in intercropping system with different major crops. It is an important conventional pulse crop of India. The calorific value of green gram is 334 calories per 100 g. it is known for high nutritional content crude protein 24.0%, fat 1.3%, carbohydrate 56.6%, minerals 3.5%, lysine 0.43%, methionine 0.10% and tryptophan 0.04%” (Rojh *et al*. 2024). “The World Health Organization recommends a per capita consumption of pulses at 80 g/day and the Indian Council of Medical Research (ICMR) has recommended a minimum consumption of 40 g/day. It has a wide range of adaptability due to short growth period, high tonnage capacity and outstanding nutritional values of food, feed and forage. Among the various constraints to low productivity of mungbean, inadequate use of fertilizers and lack of improved package of practices are important. Weeds are the most severe and widespread biological constraint on agricultural production systems and cause damage to crop and non-cropped lands. They reduce crop yield and degrade the quality of the produce, besides raising the cost of production. Besides causing crop losses, weeds are also responsible for reducing crop quality, nutrient status of soil etc. Preservation of soil health is prime need for sustainable crop production and balanced utilization of natural resources without affecting their quality. Farmers preferred conventional tillage, which adversely affect soil health by repeated harrowing, ploughing and cultural operations. The processes of land conversion and agricultural intensification are significant causes of soil quality loss and environmental impact. The influence of soil tillage systems on soil properties and energy efficiency is shown by the important factors of soil fertility conservation and evaluation of agricultural system sustainability. Minimum and zero tillage technologies for soil protection are specific and important ways for resource and energy saving in agriculture” (Teli *et al.,* 2023). “The conservation agriculture based technology was developed and tested in different climates and crops and it was adopted in more than 165 mha area in globally. It had confirmed that Zero tillage is an efficient strategy for management of land and water resources for producing more yield and reduced cost” (Singh *et al.*, 2021). “Zero tillage can reduce the cost of tillage operations and lower down the cost of “production (20-25%). In addition to this it eliminates the need for number of tillage operations, reduced planting time and saves fuel and labour cost and it has the potential to give higher productivity too. The total annual agricultural production losses were mainly caused by weeds (45%) followed by insects (30%), diseases (20%) and other causes (5%)” (Sinchana *et al.*, 2020). “One of the major constraints in mungbean production is weed competition. Mungbean yield may be reduce up to 90 percent due to uncontrolled weeds depending upon cultivars, soil moisture level, soil types, and other environmental conditions. Mungbean yield losses of 27-100 percent have been reported at different part of the world due to weed competition” (Mishra *et al.*, 2023).

**Materials and methods**

The field experiments were carried out during *kharif* season (2023) in randomized block design (RBD) with consisted ten treatments *viz*., Weedy check (T0), Pendimethalin (PE) (T1), Pendimethalin (PE) + 1 HW at 30 DAS (T2), Imezathyper (PoE) (T3), Imezathyper (PoE) + 1 HW at 30 DAS (T4), Quizolofop ethyl (PoE) (T5), Pendimethalin fb Quizolofop ethyl (PoE) (T6), Pendimethalin (PE) fb Imezathyper (PoE) (T7), Imezathapyr + Imazamox (RM) – PoE (T8), Weed free (2 HW at 20 DAS and 40 DAS) (T9) at Research Farm, Suresh Gyan Vihar University - Jaipur, Rajasthan. The experimental farm is geographically located at 75° 51’44” E longitude, 26°48’35’’ N latitude and an altitude of 432 m above mean sea level (AMSL). The experimental fields were clay loam and the soil fertility status contained available nitrogen (137.8 kg ha-1) by Subia and Asija 1996, available phosphorus (16.3 kg ha-1) by Olsen *et al*. 1954 and available potassium (250.12 kg ha-1). The organic carbon content was from 0.34-0.38 per cent. The weekly mean maximum and minimum temperatures were of temperature during both summers (40.6º C) and winters (2.7º C). The mean relative humidity fluctuated from 63.50 to 91 per cent during the crop season. The average rainfall is 557 mm per annum, which is mostly received during July to September. The sporadic showers during winters are also common, which are probably observed during this period. The observation were recorded at harvest was analysed by statistical methods (Fisher, R.A. 1950).

**Result and Discussion**

It is clear from the result of present study that, integrated weed management had significantly affected the growth and yield parameters of mungbean at harvest. Weed free plot (T9) recorded the highest growth attributes *viz*. plant height (61.91 cm), dry matter accumulation (295.55 g m-2), number of branches plant-1 (10.76) and number of nodules plant-1 (35.02) at harvest which was remained statistically superior over weedy check and rest of the treatments (Table-1). The reason for higher values on growth parameter can be discussed in the light of fact that application of weed control treatments lead to less weed competition. The reduction in weed competition through different weed management practices not only favored crop growth with abundant, availability of moisture, light and space but also reduced the weed interference, facilitating vigorous growth and development of crop plants. None of the weed management practices proved superior over the weed free treatment. It is well established fact that weed free plot has not weed crop competition that’s why weed free plot was superior to all other treatments. These results are in close conformity with the findings of Marskole *et al*., (2019).

Further yield attributes and yields like number of pods plant-1 (13.89), number of seeds pod-1 (7.49), seed yield (1308 kg ha-1), stover yield (2307 kg ha-1) and biological yield (3615 kg ha-1) presented in table 2, recorded weed free plot (T9) over weedy check and rest of the treatments. Higher attributes is due to lesser weed competition which provide better environment for crop growth and development. In these treatments weed population and their growth were controlled due to control of weed flush by herbicides and hand weeding. Significantly lower yield attributes were shown by Maji *et al* (2021) Parmar (2023).

**Conclusion: -**

The influence of soil tillage systems on soil properties and energy efficiency is shown by the important factors of soil fertility conservation and evaluation of agricultural system sustainability. Minimum and zero tillage technologies for soil protection are specific and important ways for resource and energy saving in agriculture. Based on the results of one year experimentation, it may be concluded that the Weed free plot (2 HW at 20 DAS and 40 DAS) found suitable to produce higher seed yield, straw yield and biological yield of mungbean.

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**References:-**

Fisher, R.A. 1950. Statistical methods for research workers. *Pub. Oliver and Boyd, Edinburgh, London.*

Maji, S., Md. Hasim R. and Nath, R. 2021. Herbicidal management in monsoon green gram (*Vigna radiata* (L.) Wilczek) and its effect on the following rapeseed (*Brassica campestris* L. var. Yellow Sarson) in the Indo-Gangetic plains of Eastern India. *Journal of the Saudi Society of Agricultural Sciences,* **19**(2020): 499–509.

Marskole, N. 2019. Effect of Integrated Nutrient Management on Growth and Seed yield of Cow Pea. M.Sc. (Horti.) Thesis, Indra Gandhi Krishi Vishvidhyalya, Raipur, Chhatishgarh. 176p.

Mishra, H., Kushwaha, H.S. and Kumar, A.K. 2023. Effect of post–emergence herbicides on weed flora, growth and production efficiency of mungbean (*Vigna radiate*). *Annals of Agricultural Research*, ***44***(2): 183-189.

Olsen, S.R., Cole, C.V., Wataonable, F.S. and Dean, L.A. 1954. Estimation of available phosphorus in soils by extraction with sodium carbonate. *Circular USDA*. 939.

Parmar, P.V., Patel, T.U., Baldaniya, M.J. and Chaudhary, C.S. (2023). Weed diversity and yield of cowpea as influenced by weed management practices. *The Pharma Innovation Journal*, **11**(3): 2126-2129.

Sinchana, J.K. 2020. Different weed management practices in bush type vegetable cowpea (*Vigna unguiculata* subsp. unguiculata). M. Sc. (Ag) thesis, Kerala Agricultural University, Thrissur, 181p.

Singh, R. and Singh, G. 2021. Influence of herbicides on symbiotic parameters, growth, yield and nutrient uptake in mungbean [*Vigna radiata* (L.) Wilczek]. [*Archives of Agronomy and Soil Scienc*](https://www.tandfonline.com/gags20)*e*. **67**(3): 2021.

Teli, K.G., Mundra, S.L., Sharma, N.K. and Kumar, A. 2020. Effect of weed management and phosphorus nutrition on yield of cowpea [*Vigna unguiculata* (L.) Walp.]. *Journal of Pharmacognosy and Phytochemistry*, **9**(2): 1165–1167.

Polak, R., Phillips, E. M., & Campbell, A. (2015). Legumes: Health benefits and culinary approaches to increase intake. *Clinical Diabetes,* **33**(4), 198–205.

Rojh, R., Bijarnia, H. K., Dhaker, D. L., Shivran, H., Choudhary, B. and Sonu (2024). Effect of nitrogen and phosphorus levels on growth, yield and quality of mungbean [*Vigna radiata* (L.) Wilczek]. *International Journal of Research in Agronomy*, **7**(10): 296-298.

**Table: 1 Effect of integrated weed management on growth attributes of mungbean**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatments** | **Growth attributes** | | | |
| **Plant height**  **(cm)** | **Dry matter accumulation**  **(g plant-1)** | **Number of branches plant-1** | **Number of nodules plant-1** |
| T0: Weedy check | 50.30 | 177.29 | 5.42 | 28.71 |
| T1: Pendimethalin (PE) | 67.09 | 215.61 | 8.23 | 31.51 |
| T2: Pendimethalin (PE) + 1 HW at 30 DAS | 70.85 | 250.84 | 10.21 | 34.17 |
| T3: Imezathyper (PoE) | 65.82 | 201.49 | 6.59 | 30.53 |
| T4: Imezathyper (PoE) + 1 HW at 30 DAS | 69.28 | 239.35 | 9.65 | 33.34 |
| T5: Quizolofop ethyl (PoE) | 65.98 | 203.24 | 7.65 | 30.67 |
| T6: Pendimethalin (PE) *fb* Quizolofop ethyl (PoE) | 68.19 | 225.31 | 9.02 | 32.34 |
| T7: Pendimethalin (PE) *fb* Imezathyper (PoE) | 68.22 | 228.79 | 9.08 | 32.47 |
| T8: Imezathapyr+ Imazamox (RM) PoE | 64.52 | 190.78 | 6.03 | 29.57 |
| T9: Weed free (2 HW at 20 DAS and 40 DAS) | 61.91 | 259.55 | 10.76 | 35.02 |
| SEm± | 0.34 | 2.89 | 0.17 | 0.27 |
| CD (P=0.05) | 1.04 | 8.67 | 0.52 | 0.81 |
| CV (%) | 10.35 | 8.61 | 9.27 | 8.20 |

**Fig: 1 Effect of integrated weed management on growth attributes of mungbean**

**Table: 2 Effect of integrated weed management on yield attributes, yields and harvest index of mungbean**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | **Yield attributes** | | | | |
| **Number of pods/plant** | **Number of seeds/pod** | **Seed yield (kg/ha)** | **Straw yield (kg/ha)** | **Biological yield (kg/ha)** |
| T0: Weedy check | 10.28 | 5.46 | 673 | 1473 | 2146 |
| T1: Pendimethalin (PE) | 12.6 | 6.61 | 1176 | 2259 | 3435 |
| T2: Pendimethalin (PE) + 1 HW at 30 DAS | 13.5 | 7.21 | 1193 | 2398 | 3591 |
| T3: Imezathyper (PoE) | 11.8 | 6.04 | 992 | 2069 | 3061 |
| T4: Imezathyper (PoE) + 1 HW at 30 DAS | 13.36 | 7.18 | 1148 | 2256 | 3404 |
| T5: Quizolofop ethyl (PoE) | 12.20 | 6.34 | 1001 | 2085 | 3086 |
| T6: Pendimethalin (PE) *fb* Quizolofop ethyl (PoE) | 12.96 | 6.88 | 1084 | 2170 | 3254 |
| T7: Pendimethalin (PE) *fb* Imezathyper (PoE) | 13.32 | 7.13 | 1103 | 2176 | 3279 |
| T8: Imezathapyr+ Imazamox (RM) PoE | 11.38 | 5.77 | 941 | 1988 | 2929 |
| T9: Weed free (2 HW at 20 DAS and 40 DAS) | 13.89 | 7.49 | 1308 | 2307 | 3615 |
| SEm+ | 0.12 | 0.08 | 13 | 25 | 38 |
| CD (P=0.05) | 0.36 | 0.23 | 38 | 75 | 113 |
| C.V. (%) | 8.36 | 7.89 | 9.26 | 9.78 | 9.01 |

**Fig: 2 Effect of integrated weed management on yield attributes, yields and harvest index of mungbean**