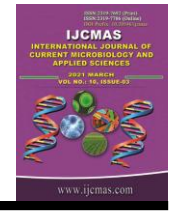
Int.J.Curr.Microbiol.App.Sci (2021) *10*(03): 1152-1161

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 10 Number 02 (2021)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2021.1003.142

Effect of Moisture Conservation Practices and Sulphur Fertilization on Growth, Yield Attributes and Yield of Mothbean [*Vigna aconitifolia* (Jacq.) Marechal]

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A B S T R A C T

A field experiment was conducted at Agronomy farm, S.K.N. College of Agriculture, Jobner, Jaipur (Rajasthan) during *kharif* season of 2018 to study the effect of moisture conservation practices and sulphur fertilization on growth, yield attributes and yield of mothbean. The experiment comprising of five moisture conservation practices (control, dust mulch, pusa hydrogel, stover mulch, pusa hydrogel + stover mulch) and four sulphur fertilization levels (control, 15, 30 and 45 kg/ha), thereby making 20 treatment combinations was laid out in factorial randomized block design and replicated thrice. Results showed that different moisture conservation practices and sulphur fertilization brought considerable improvement in growth, yield attributes and yield in mothbean. Among moisture conservation practices, stover mulch proved significantly superior to control, dust mulch, pusa hydrogel with respect to growth attributes (plant height, dry matter accumulation, number of branches and root nodules) and remained at par with pusa hydrogel + stover mulch. The yield attributes (number of pods/plant and number of seeds/pod), and seed yield (805 kg/ha), stover yield (1862 kg/ha) and biological yields (2667 kg/ha) were also significantly higher under the treatment stover mulch over control, dust mulch, pusa hydrogel but remained at par with pusa hydrogel + stover mulch. Result further showed that every increase in level of sulphur fertilization up to 30 kg/ha by and large significantly improved most of the growth and yield determining characters of mothbean over lower levels. It also recorded significantly higher seed yield (816 kg/ha), stover yield (1905 kg/ha) and biological yields (2721 kg/ha) over control and 15 kg/ha and found at par with 45 kg/ha.

Keywords

Moth bean, Pusa hydrogel, Stover mulch, Sulphur fertilizer and yield

Article Info

Accepted:
10 February 2021
Available Online:
10 March 2021

Introduction

Pulses are the main source of protein particularly for vegetarians and contribute about 14 per cent of the total protein of an average Indian diet. The per capita availability of pulses has been declined from 64.5 g in 1960 to 54.7 g in 2017 as against the minimum requirement of 84 g per day per capita (Anonymous, 2017). India produced 16.47 million tonnes of pulses from 25.26 million hectares with an average productivity of 652 kg/ha (Anonymous, 2015-16). Among pulses, mothbean is one of the important pulse crop. It belongs to the family Leguminosae and sub family papilionaceae. It is also known as moth, dew gram and kidney bean and it is an indispensable component of dryland farming system in arid and semi-arid regions because it is the most drought tolerant crop among kharif pulses largely grown predominantly on dryland areas with least agronomic practices. Being a leguminous crop, it forms symbiosis with rhizobia and fix atmospheric nitrogen and thus provide sufficient nitrogen to meet the plant need. Mothbean contains about 20.5 per cent easily digestible protein being relatively rich in lysine and tryptophan, the essential amino acids in which cereals are deficient. Mothbean is mainly grown in Rajasthan, Haryana, Gujarat, Maharashtra and Uttar Pradesh. Rajasthan is an important producer of mothbean. It produces 2.97 lakh tonnes from 10.87 lakh hectares with productivity of 274 kg/ha (Anonymous, 2015-16).

The greater part of Rajasthan is characterized by arid and semi-arid climate. The soils of major part of the state are light in texture having low water retention capacity. In order to mitigate the adverse effects of water stress, checking evaporation loss from the soil and prolonging the availability of moisture to the crop shows the importance of mulches. Use of mulches in crop fields regulates soil moisture, stabilizes soil temperature, suppresses weed growth, minimizes leaching loss of nutrients, checks excessive evaporation, reduces soil erosion and improves production and quality of crops. Hence, concerned efforts are needed to develop soil moisture conservation practices to mitigate the water stress condition to increase production with minimum environment degradation. The risk factor can be minimized through in-situ moisture conservation, selection of suitable crop and its variety (Kumar *et al.*, 2008). Mustard stover is readily available in the areas where it is grown particularly in arid and semi-arid regions. Mustard stover mulch is spread over the soil surface after sowing of crop. Application of crop residue on soil surface as a mulch reduces the loss of water through evaporation and moderate the soil profile temperature. Use of plastic film mulch for agriculture is at conceptual in our country due to its higher cost. Dust mulch or soil mulch of 5-8 cm also used to reduce the water losses as evaporation, among all the mulches dust mulch is the cheapest.

Water is an important lifesaving natural resource for the crop. It profoundly influences photosynthesis, respiration, absorption, translocation and utilization of mineral nutrients and cell division. Due to limited availability of irrigation water in India, it is important to increase irrigation efficiency and water productivity of crop and to exploit the existing water potential by reducing the losses of water and also ensuring better living condition for crop growth. The use of sol conditioners like super absorbent polymer (hydrogel) has a great potential to exploit the existing water in soil for agricultural crops by increasing their production. Pusa hydrogel is a novel semi-synthetic superabsorbent polymer developed by Indian Agricultural Research Institute (IARI) has shown the potential to realize more yield/m^2 input. Pusa hydrogel is a cross-linked polymer with a hydrophilic group which have the capacity to absorb large quantities of water without dissolving in water. It can be easily applied directly in the soil at the time of sowing of field crops. Pusa hydrogels are not only used for water saving but they also have tremendous potential to improve physio-chemical and biological properties of the soil. It works as an anti-drought mechanism and reduces the irrigation requirement of plants. It improves physical properties of soil, seed germination, seedling emergence rate, root growth and density that help plants to prolonged moisture stress (Ekebafe *et al.*, 2011).

Sulphur is being considered as the fourth major nutrient whose deficiency has especially been observed in soils of Jaipur, Jodhpur and Udaipur districts. (Tandon, 1986). Sulphur plays an important role in many physiological processes of plant like synthesis of sulphur containing amino acids (Cystine, Cysteine and Methionine), synthesis of certain vitamins (biotin and thiamine), coenzyme-A, metabolism of carbohydrates, proteins and fats. Sulphur also have an essential role in development of root nodules in pulses and increase drought tolerance in pulses and oilseeds by the process of disulphide linkage.

Research work done in different parts of the country indicated that application of sulphur in pulses is highly profitable and seems essential for boosting the crop production. Crop removal is the major cause of sulphur depletion in soil. It has been reported that, on an average, production of one tonne of pulses require 12 kg S/ha (Kanwar and Mudahar, 1985). Since the soils of this region are deficient in sulphur and this element plays a direct role in plant metabolism. Hence, in the present study, different effects of moisture conservation practices and sulphur fertilization are evaluated under semi-arid conditions of Rajasthan for growth, yield attributes and yield of mothbean.

Materials and Methods

The experiment was conducted during *kharif* season 2018 at Agronomy farm, S.K.N. College of Agriculture, Jobner, Jaipur (Rajasthan). The soil of the experimental field was loamy-sand in texture, alkaline in reaction (pH 8.25), poor in organic carbon (0.23 %), low in available nitrogen (124.7 kg/ha) and available sulphur (8.06 ppm) and medium in phosphorus (16.10 kg/ha) and potassium (150.24 kg/ha). The experiment consisting of five moisture conservation practices (control, dust mulch, pusa hydrogel, stover mulch, pusa hydrogel + stover mulch) and four sulphur fertilization levels (control, 15, 30 and 45 kg/ha), thereby making 20 treatment combinations was laid out in factorial randomized block design and replicated thrice. The plot size was 4.0 m x 3.0 m. Mothbean crop was sown on 8th July 2018. Dust mulch was created by hoeing between the rows at 25 DAS. Stover mulch using waste mustard stover @ 5t/ha was spread between the rows at 28 DAS. Pusa hydrogel was applied in respective plots as band. Sulphur as per treatment was applied through gypsum. The weighed quantity of sulphur was applied in respective plots and incorporated uniformly in whole plot.

A uniform application of 20 kg N and 40 kg P_2O_5 /ha was applied to all the plot through urea and DAP respectively. Thinning, hoeing and weeding were done after 25 days of sowing to maintain recommended spacing and proper aeration. Five plants were selected randomly from each plot and tagged permanently. The height of each plant was measured from base of the plant to the tip of main shoot at 40 DAS and at harvest. Dry matter production was recorded at 40 DAS and at harvest stage. For this, plants from one metre row length were uprooted randomly from sample rows of each plot. After removal of root portion, the samples were first air dried for some days and finally dried in an electric oven at 70^0C till constant weight. For counting the number of root nodules per plant at 40 DAS, five plants in each plot were randomly selected in sampling rows and removed them carefully after wetting the soil and taking the soil upto 30 cm depth. The total number, fresh and dry weight of root nodules per plant counted at 40 DAS.

Total number of pods of the five plants already selected was counted and mean value for number of pods per plant was calculated. Ten pods were selected from each plot from previously selected plants and number of seeds per pod was counted and mean value for number of seeds per pod was calculated. Mothbean crop was harvested on 10^{th} September, 2018 after leaving two border rows on each side of plot along the length on both sides, a net area of 3.0m × 1.8m was harvested separately from each plot to assess the grain yields from net plot area.

A small seed sample was taken from the produce of each of the plot harvested and 1000-seeds were counted and weighed in grams and recorded as test weight. In each plot, bundles were tied and tagged properly and transported on threshing floor for proper sun drying. The total biomass harvested from each net plot was threshed, cleaned and dried. The clean grain obtained from individual plot was weighed separately and weight recorded as grain yield (kg/plot). The straw yield (kg/plot) was obtained by subtracting the grain yield from biological yield recorded earlier.

Harvest index was computed by using the formula given by Singh and Stoskopf (1971) which is expressed as:

$$\text{Harvest index (\%)} = \frac{\text{Economic yield}}{\text{Biological yield}} \times 100$$

Results and Discussion

Effect of moisture conservation practices

Effect on growth parameters

The data on growth parameters viz., plant height, dry matter accumulation per metre row length, number of branches per plant, total number of root nodules, fresh and dry weight of root nodules per plant at different stages of observation as affected by different treatments are presented in table 1. The data (Table 1) on plant height indicated that it was significantly influenced by different moisture conservation practices at 40 DAS and at harvest. Significantly taller plants (17.85 and 29.78 cm at 40 DAS and at harvest, respectively) were observed under the treatment stover mulch which was at par with pusa hydrogel + stover mulch. Results given in table 1 indicated that all the moisture conservation practices significantly increased the total number of branches/plant over control at harvest. Among the moisture conservation practices on average significantly higher number of branches/plant (4.98) recorded at harvest under treatment stover mulch. The data presented in table 1 revealed that dry matter accumulation of mothbean per metre row length recorded at 40 DAS and at harvest was found significant due to moisture conservation practices. Significantly higher dry matter accumulation of 34.10 and 109.01 g/m row length was recorded under treatment stover mulch at 40 DAS and at harvest, respectively which was at par with pusa hydrogel + stover mulch. Results given in table 1 indicated that all the moisture conservation practices significantly increased the total number of nodules per plant, fresh and dry weight of root nodules per plant. Among the moisture conservation practices on average significantly higher number of nodules/plant (14.62), fresh (130.85 mg) and dry (72.60 mg) weight of root nodules per plant recorded at 40 DAS under treatment stover mulch. Soil moisture stress is a major limiting factor in determining the growth and yield of mothbean. The application of stover mulch led to better plant growth by changing the microclimate by conserving more moisture through reducing evaporation, altering soil temperature, reduces weed flora and thus economizing the use of irrigation water. Because of this there might be increased moisture availability for longer duration, which in turn might have resulted in the better growth and development of the plants grown under the application of stover mulch. Similar results were also observed by Verma (2002) and Singh (2014) in cluster bean.

In the present investigation, significant increase in plant height, dry matter accumulation and number of pods/plant were noticed due to soil application of pusa hydrogel. This increase in plant height, dry matter accumulation and number of pods/plant was due to more retention of moisture and its longer availability to crop, where it might have helped to increase the activity of cell division, expansion and elongation, ultimately leading to increased growth attributes. Similar findings were also reported by Sivalapan (2001) in soybean. Dry matter production is an indication of the overall utilization of resources and better light interception. Similarly, significant increase in dry matter production due to hydrogel polymer was reported by Yazdani *et al.,* (2007) in soybean.

Effect on yield attributes and yield

The results pertaining to number of pods/plant, seeds/pod, test weight, seed, stover, & biological yields and harvest index (Table 2) indicated that all moisture conservation practices were significantly better than control in increasing yield attributes and yield of mothbean. The result revealed that treatment stover mulch recorded significantly higher number of pods/plant (27.40), seeds/pod (5.50) and test weight (28.11g) than control, dust mulch and pusa hydrogel but remained at par with pusa hydrogel + stover mulch. It seems that moderate hydrothermal regimes under mulching treatments might have resulted in better plant development. Thus, the improvement in yield attributes of mothbean under mulching practices could be ascribed to better availability of moisture and moderation of soil temperature which led to greater uptake of nutrients and reduced number of days taken to meet the required heat units for proper growth and development of plants and ultimately the yield attributes.

Similar results have been reported by Kanwar *et al.,* (2017) in pearl millet. Similarly, the seed, stover and biological yield increased significantly due to mulching practices over no mulch and pusa hydrogel (Table 2). The result revealed that treatment stover mulch recorded significantly higher seed yield (805 kg/ha), stover yield (1862 kg/ha) and biological yields (2667 kg/ha) than control, dust mulch and pusa hydrogel but remained at par with pusa hydrogel + stover mulch. However, the harvest index of mothbean did not influenced significantly due to moisture conservation practices.

The beneficial effect of plastic and stover mulch on seed yield might be due to favourable soil moisture regime and its better utilization in production of large number of seeds possibly by reducing floral abortion, maintenance of a steady flux of assimilates during grain filling, reducing the rate of leaf senescence and maintenance of photosynthetic activity of surviving leaves and enhanced remobilization of pre anthesis assimilates to seed during seed filling. Similar finding was reported by Verma (2002) in pearl millet and Sekhon *et al.,* (2005) in soy bean, Chhetri *et al.,* (2015) in black gram.

Table.1 Effect of moisture conservation practices and sulphur fertilization on plant height, dry matter accumulation, branches/plant, total number of root nodules/plant and weight of root nodules in mothbean

Treatments	Plant height (cm)		Dry matter accumulation (g/m row length)		Branches/ plant	Total number of root nodules/plant	Weight of root nodules (mg/plant)	
	40 DAS	At harvest	40 DAS	At harvest	At harvest		Fresh wt	Dry wt
Moisture conservation practices								
Control	13.88	23.27	26.50	80.10	3.55	11.30	102.03	54.20
Dust mulch	14.97	25.45	28.80	89.40	4.13	12.50	111.37	60.90
Pusa hydrogel	16.29	27.58	31.20	95.71	4.55	13.32	120.07	66.70
Stover mulch	17.85	29.78	34.10	103.91	4.98	14.62	130.85	72.60
Pusa hydrogel + Stover mulch	18.41	29.95	35.40	109.01	5.18	15.05	137.43	75.02
SEm ±	0.37	0.70	0.73	2.12	0.12	0.27	2.51	1.44
CD (P=0.05)	1.07	2.01	2.08	6.08	0.34	0.78	7.20	4.12
Sulphur levels (kg/ha)								
Control	13.36	24.67	27.05	84.95	3.95	11.93	104.25	57.06
15	15.58	26.56	30.25	93.35	4.36	13.00	117.53	63.16
30	17.68	28.54	33.15	100.05	4.71	14.03	126.83	70.36
45	18.50	29.04	34.35	104.15	4.89	14.48	132.78	72.96
SEm ±	0.33	0.63	0.65	1.90	0.11	0.25	2.25	1.29
CD (P=0.05)	0.96	1.79	1.86	5.44	0.30	0.70	6.44	3.69
CV (%)	7.94	8.92	8.06	7.69	9.21	7.11	7.24	7.57

Table.2 Effect of moisture conservation practices and sulphur fertilization on yield attributes, grain, stover and biological yield and harvest index in mothbean

Treatments	Yield attributes			Yield (kg/ha)			Harvest index
	Pods/ plant	Seeds/pod	Test weight (g)	Seed yield (kg/ha)	Stover yield (kg/ha)	Biological yield (kg/ha)	
Moisture conservation practices							
Control	18.60	4.20	26.70	590	1468	2057	28.62
Dust mulch	21.30	4.60	26.90	660	1598	2258	29.19
Pusa hydrogel	24.20	5.05	27.40	726	1713	2438	29.72
Stover mulch	27.40	5.50	28.11	805	1862	2667	30.15
Pusa hydrogel + Stover mulch	28.60	5.65	28.31	852	1961	2813	30.25
SEm ±	0.66	0.12	0.65	19	39	61	0.64
CD (P=0.05)	1.88	0.33	NS	54	113	174	NS
Sulphur levels (kg/ha)							
Control	20.03	4.30	26.61	535	1300	1835	29.09
15	23.11	4.90	27.11	736	1757	2493	29.44
30	25.77	5.31	28.01	816	1905	2721	29.92
45	27.17	5.48	28.21	820	1918	2738	29.89
SEm ±	0.59	0.10	0.58	17	35	55	0.57
CD (P=0.05)	1.69	0.30	NS	49	101	156	NS
CV (%)	9.49	8.04	8.16	9.05	7.92	8.63	7.48

NS- Non-significant

Effect of sulphur fertilization

Effect on growth parameters

Sulphur fertilization with 30 and 45 kg S/ha being at par with each other, proved significantly better over control and 15 kg S/ha in terms of growth parameters (plant height, number of branches/plant, dry matter accumulation, total number of root nodules, fresh and dry weight of root nodules per plant) (Table 1). It may be attributed due to the fact that application of sulphur improved not only availability of S but other nutrients also which are considered vitally important for growth and development of plants. The application of sulphur through gypsum which contains S in readily available form enhanced the concentration of sulphur in soil solution for plants absorption. Besides, it also lowered the soil pH which was responsible for greater availability and motility of nutrients. Increase in growth parameters with sulphur fertilization were also observed by Sepat and Yadav (2008) in mothbean, Singh *et al.,* (2018), Prajapat *et al.,* (2011) and Ram *et al.,* (2008) in green gram.

Effect on yield attributes and yield

The considerable improvement in yield attributes viz., number of pods per plant, seeds per pod and test weight, were observed due to sulphur fertilization. Increasing levels (Table 2) of sulphur fertilization up to 30 kg S/ha significantly increased the number of pods per plant (25.77), seeds per pod (5.31) and 1,000-seed weight (28.01g), seed yield (816 kg/ha), stover yield (1905 kg/ha) and biological yield (2721 kg/ha) of mothbean and remaining at par with 45 kg S/ha. However, the harvest index of mothbean did not influenced significantly due to sulphur fertilization. When supply of sulphur is optimum, greater translocation of photosynthates occurs from leaves towards sink i.e., yield attributes. This resulted in more pods and capsules containing greater number of seeds and bold seeds. The seed and stover yields primarily being a function of cumulative response of growth and yield attributing characters increased remarkably with increase in sulphur level. These results are in conformity with the findings of Sepat and Yadav (2008) in mothbean, Nagar and Meena (2005) in cluster bean, Patel *et al.,* (2018) in black gram, Jadeja *et al.,* (2016) and Prajapat *et al.,* (2011) in chickpea.

On the basis of the findings of the present investigation, it can be concluded that application of stover mulch @ 5t/ha and soil application of sulphur at 30 kg/ha was found the most superior treatment as it significantly enhanced the growth parameters, yield attributes and yield of mothbean.

Acknowledgement

The authors are thankful to Head, Department of Agronomy, S.K.N. College of Agriculture, Jobner for providing field staff, facilities and assistance in conducting this research.

References

Anonymous, 2015-16. Directorate of Agriculture, Rajasthan. Crop-wise fourth advance estimation of area, production and yield of various principal crops.

Anonymous, 2017. Economic Survey, Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Government of India.

Anonymous, 2015-16. Government of India, Ministry of Agriculture & Farmers Welfare Department of Agriculture, Cooperation & Farmers Welfare, Directorate of Economics and Statistics. *Agricultural Statistics at a*

Glance 2016.

Chhetri, B., Dahal, D., Mahato, S.K., and Khawas, T. 2015. Moisture conservation practices in black gram (*Vigna mungo*) based intercropping system under rainfed condition. *International Journal of Agriculture Sciences* 7(3): 454-459.

Ekabafe, I.O., Ogbeifun, D.E. and Okieimen, F.E. 2011. Polymer applications in agriculture. *Biochemistry* 23(2): 81-89.

Jadeja, A.S., Rajani, A.V., Foram, Chapdiya, Kaneriy, S.C. and Kanwar, N.R. 2016. Soil application potassium and sulphur and effect on growth and yield components of chickpea under south saurashtra region of Gujrat. *International Journal of Science, Environment and Technology* 5: 3172-3176.

Kanwar, J.S. and Mudahar, M.S. 1985. Fertilizer sulphur and food production research and policy implications for tropical countries. *Fertilizer News* 30(11): 37-54.

Kanwar, S., Gupta, V., Rathore, P.S. and Singh, S.P. 2017. Effect of soil moisture conservation practices and seed hardening on growth, yield, nutrient content, uptake and quality of pearl millet. *Journal of Pharmacognosy and Phytochemistry* 6(4): 110-114.

Kumar, M., Singh, R.A. and Singh, S.P. 2008. Performance of moisture conservation practices and levels of nitrogen on sorghum (*Sorghum bicolour*) under rainfed ecosystem of central Uttar Pradesh. *Indian Journal of Soil Conservation* 36(1): 22-23.

Nagar, K.C. and Meena, N.L. 2005. Effect of phosphorus, sulphur and phosphorus solubilizing bacteria on growth and yield of clusterbean. *Journal of Farming Systems Research & Development* 11(1): 65-68

Patel, A.K., Nath, T., Prajapati, A., Singh, V.K. and Pandey, S.K. 2018. Effect of doses and sources of sulphur on growth and yield of black gram (*Vigna mungo* L. Hepper) under rainfed condition of Vindhyan Soil. *Journal of Pharmacognosy and Phytochemistry* 1: 91-94.

Prajapat, K., Shivran, A.C., Yadav. L.R. and Choudhary, G.L. 2011. Growth, production potential and economics of mungbean as influenced by intercropping systems and sulphur levels. *Journal of Food Legumes* 24(4): 330-331.

Ram, V., Ali, M., Mishra, S.K. and Upadhyay, R.M. 2008. Studies on sulphur, zinc and biofertilizers on yield, yield attributes and nutrient content at different growth stages in mungbean. *Journal of Food Legumes* 21(4): 240-242.

Sekhon, N.K., Hira, G.S., Sidhu, A.S. and Thind, S.S. 2005. Response of soybean (*Glycine max* Mer.) to wheat straw mulching in different cropping seasons. *Soil Use and Management* 21(4): 422-426.

Sepat, S. and Yadav, S.S. 2008. Phosphorus and sulphur management in mothbean (*Vigna aconitifolia* (Jacq.) Marechal) under rainfed conditions. *Annals of Agriculture Research* 29(1, 2, 3 and 4): 38-42.

Singh, D.K., Singh, S., Kumar, V. and Kumar, A. 2018. Impact of phosphorus and Sulphur organo mineral fertilizers on growth and yield attributes of green gram (*Vigna radiata* (L.) Wilczek) on alluvial soil. *International Journal of Chemical Studies* 6(2): 2983-2987.

Singh, I. D. and Stoskopf, N. C. 1971. Harvest index in cereals. *Agronomy Journal* 63(2): 224-226.

Singh, R. 2014. Improved cultivation practices for clusterbean in kharif and summer season. Central Arid Zone Research Institute, Jodhpur (Rajasthan), pp. 1-8.

Sivapalan, S. 2001. Effect of a polymer on growth and yield of soybeans (*Glycine max*) grown in a coarse textured soil. *Proceedings Irrigation 2001 Regional Conference*, Pp. 93-99, Toowoomba, Queensland, Australia.

Tandon, H.L.S. 1986. *Sulphur Research and Agricultural Production in India*, II Edn. Pub. FDCO, New Delhi.

Verma, O.P. 2002. Effect of nitrogen and mulching on growth and productivity of pearl millet (*Pennisetum glaucum*) (L.) R.Br. emend Stuntz. M.Sc. (Ag.) Thesis submitted to Rajasthan Agricultural University, Bikaner (Raj.).

Yazdani, F., Allahdadi, I. and Akbari, G.A. 2007. Impact of superabsorbent polymer on yield and growth analysis of soybean (*Glycine max* L.) under drought stress condition. *Pakistan Journal of Biological Sciences* 10(23): 4190-4196.

How to cite this article:

Monu Jorwal, B. L. Dudwal, Kamal Garg, Bharat Lal Meena and Sonu Meena. 2021. Effect of Moisture Conservation Practices and Sulphur Fertilization on Growth, Yield Attributes and Yield of Mothbean [*Vigna aconitifolia* (Jacq.) Marechal]. *Int.J.Curr.Microbiol.App.Sci.* 10(03): 1152-1161. doi: https://doi.org/10.20546/ijcmas.2021.1003.142