Vol.7 No. 2, 95– 98 (2018)

Received: November, 2018; Accepted: December, 2018

Short Communication

Analysis of Performance of Soybean Over Mole Drain Field with Ridge Furrow System of Sowing

Chanchal Bhargava[1] G. Deshmukh[2], S. D. Sawarkar[3] S.L. Alawa[4],and Jyoti Ahirwar[5]

1. Block Technology Manager (Plant Breeding & Genetics) ATMA, Chhindwara, MP, 2 Scientist Sr Gr (Agril. Engg.), JNKVV, KVK, Chhindwara, MP, 3. Sr. Scientist (Soil Science), JNKVV, KVK, Chhindwara, MP. 4. Programme Assistant, JNKVV, KVK, Chhindwara, MP, 5. Assistant Technology Manager (B.Tech.) ATMA, chhindwara, M.P.
E-mail: chanchalm11@gmail.com

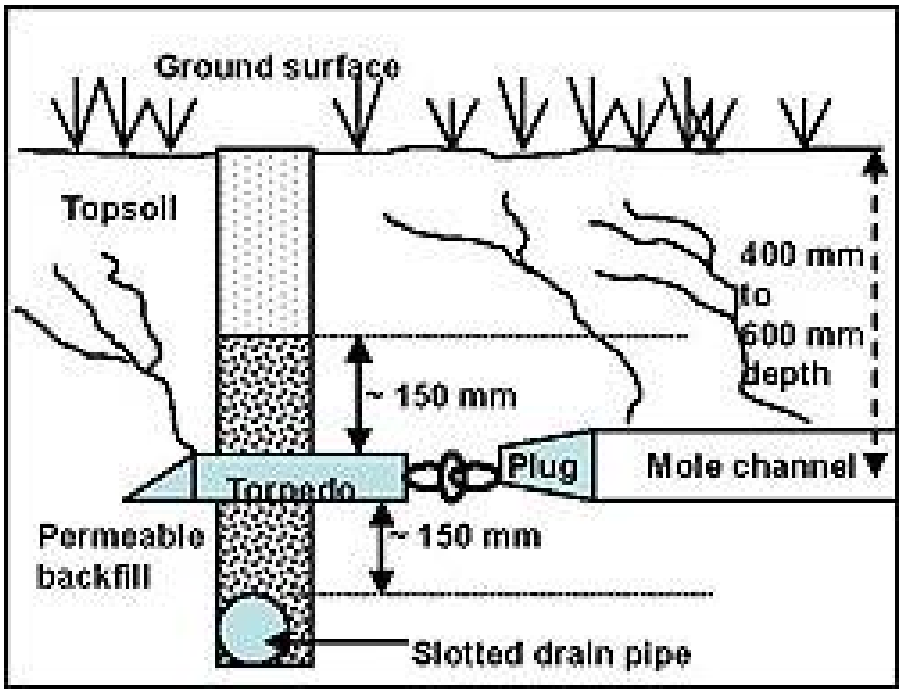
The type of tillage, plant population, row spacing, and planting date are four major management decisions that soybean farmers must consider. How individual producers choose to handle each management application depends on their own farming circumstances. The main constraints related with soybean cultivation is time and amount of rainfall, which drastically reduces the health management of soybean cultivation resulting into poor growth of plant.

Mole drains do not drain groundwater but removes excess water as it enters from the ground surface. While surface drainage can remove excess surface water, it is the soil profile itself that needs to be drained, in many situations. Mole draining can help reduce water logging problems substantially. Heavy soils with low rates of water movement need regular drainage to improve soil structure and productivity. The aim of mole draining is to fracture and crack the soil and construct unlined mole channels at consistent depth and even spacing. This allows the pastures and crops to reach their potential production and stock damage by treading and compaction to be reduced. Mole drainage is widely used in heavy soils to improve productivity of pastures and crops.

A Field experiment was conducted during Kharif seasons of 2014 and 2015 to study ridge and furrow system for soybean crop with Mole drained field at 6 farmer's field in both years respectively in Chhindwara district under Satpura plateau agro-climatic region of Madhya Pradesh, AES III with medium to deep black soils, annual average rainfall of 750-1100 mm. The experiments was conducted with 2 plots, each had an area of 1 acre as treated plot and 1 acre as conventional line sowing plot with simple seed drill sown same variety JS-95-60. Before sowing with ridge furrow system during the month of april just after harvesting of wheat from fields to use the available soil moisture of fields, fields were prepared by mole drain plough comprised of a torpedo-like cylindrical foot attached to a narrow leg, followed by a slightly larger diameter cylindrical expander. The foot and trailing expander form the mole channel while the leg creates a narrow slot that extends from

the soil surface down to the mole channel depth. Mole drains were installed at an angle (often 70 to 900) to the direction of the pipes. Excess ground water flows into and along the mole drains, then drains into the porous backfill above the pipes, and is then quickly removed to outfalls via the subsurface collector pipes.

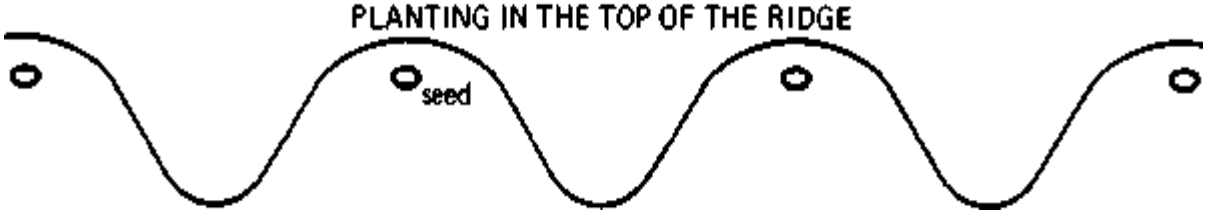
Fig 1 Mole drains over a collector pipe system.



The action of the mole plough is to form a channel in the area of the profile with a specific clay content, yet produce upward cracking of the soil profile immediately above the mole channel. These cracks allow water flow to the mole channel. The tractor drawn attachment was ran across the selected field and made a single channel that was attached with a tank at the most downward end point of the field through a collector pipe system.. The upper section of the soil profile needs to be dry enough to form cracks at the time of mole draining and the ground surface dry enough to allow traction. If too moist then the cracks can "heal" over and reduce water intake. It is extremely preferable to have a warm drying period with no rain to allow the cracks to dry and the mole channel itself to harden. Usually when the clay at mole draining depth has a moisture content of 20 to 25 %, conditions are satisfactory. Tested the soil by kneading between the fingers. Mole draining in autumn is not recommended, as the topsoil is wet and subsoil is too dry. The subsoil is difficult to mole and to dry out and it's difficult to achieve the desirable depth. Mole channels will tend to slough off and fail. Optimum mole drain depth depends on soil type, and the conditions when moles are installed. Generally moles are pulled at 400 to 600 mm depth. Same was here in the experiments. Moles less than 400 mm deep are liable to be damaged by tractors and animals during or immediately after rain. Very heavy soils and those with high contents of suitable clay down to moling depth may benefit from its first mole draining at a shallower depth due to tractor limitations. Also as the soil structure improves over time subsequent

moles can often be pulled at deeper depth. Spacing between moles was usually about 2 m in demonstrated fields. The drain outfall or outlet is the most important part of the system. If this fails the whole system fails. Mole drains can discharge to open drains, into interceptor drains filled with gravel, or preferably a collector pipe system. The suitability of any site for mole drainage must be established beforehand by means of detailed investigation. In the kharif season at the time of sowing to make the ridge and furrow system an extra attachment called ridge furrow attachment provided by SADO office Mohkhed had attached on the back tines of tractor operated seed-cum-fertilizer drill machine. Sowing seeds by front line tines and covering them by soil took place by ridge furrow attachment attached in back line tines. Thus lines of soybean automatically come over ridge favoured by formation of alternate furrows. Those furrows were useful to drain out excessive rainwater during heavy storms and for storing rainwater in furrows for enriching soil moisture through percolation in case of deficit rainfall .

Figure 2 Ridge Furrow system of sowing.



The soil moisture thus stored sustains the crop during dry spells. This field was treated field. On the other hand second field was as untreated field, where simple line sowing had done with tractor drawn seed cum fertilizer drill. The soil conditions were same both for treated and untreated fields. The plant growth character and yield contributing data such as plant height, number of branches per plant, number of seeds per pod, weight of 100 seeds, seed yield, straw yield, were recorded for soybean crop.

Table 1 growth characters of soybean

S.no.	Growth characters	Mole drained ridge furrow treated plot			Conventional untreated plot		
		2014	2015	Mean	2014	2015	Mean
1.	Plant height (cm)	62.4	64.3	63.35	53.9	55.1	54.5
2.	Number of branches plant^{-1}	5.12	5.23	5.17	4.89	4.91	4.9
3.	Number of seeds per pod	2.48	2.51	2.49	2.10	2.09	2.09
4.	Weight of 100 seeds (g)	5.21	5.33	5.27	4.01	4.12	4.06
5.	Seed yield (q ha^{-1})	13.98	14.01	13.99	11.22	11.59	11.40
6.	Straw yield (q ha^{-1})	15.68	16.24	15.96	13.25	13.85	13.55

The plant growth character and yield contributing data such as plant height, number of branches per plant, number of seeds per pod, weight of 100 seeds, seed yield, straw yield, of soybean were recorded in kharif 2014 and 2015 as shown

in table 1. Plant growth characters were found superior over mole drained ridge and furrow system plot as compared to conventional line sowing plot[1,3,4]. The maximum seed as well as straw yield of soybean was recorded when grown on mole drained ridge furrow system of planting as compared to conventional method of sowing i.e. flat bed sowing. However in both the years heavy continuous rainfall was recorded, due to that all the fields were not performed better even in maize also. Water stagnation conditions in the fields of kharif crops of 2014 and 2015 were very harmful for all kharif crops. Many fields of maize were completely vanished in 2015 due to continuous heavy rainfall. As maize is hardy crop as compared to soybean with having maximum area under cultivation of Chhindwara district. Effect of mole drained ridge furrow sowing system on the growth characters of soybean was found better in comparison with normal flat bed sowing[2].

Referances

1. Autkar, K.S., R.L.Gawande, J.S. Vyas, and R.M. Ghodpage, (2006). Effect of land configuration on yield and water use efficiency of soybean in Vertisols of Vidarbha (M.S.). Annals of Plant Physiology, 20: 158-159.
2. Lone, B. A., B. Hassan, S. Ansar-ul-haq, and M. H. Khan, (2010). Effect of seed rate, row spacing and fertility levels on relative economics of soybean (G. max. L.) under temperate conditions. African Journal of Agricultural Research, 5: 322-324.
3. Raut, V. M., S. P. Taware, G. B. Halvankar, and P. Varghese, (2000). Comparison of different sowing methods in soybean. Journal of Maharashtra Agricultural Universities, 25: 218-219.
4. Verma, Mukesh. (2008). Effect of land configurastions and seed rates on the growth and productivity of rainfed soybean grown in Vertisols. M.Sc. (Ag.) Thesis, JNKVV, Jabalpur (M.P.).