CHAPTER - I

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Cultivation of soybean (*Glycine max* Linn. Merrill) is gaining much popularity in the country, particularly in Madhya Pradesh since last two decades because of its wide adaptability under varying agroclimatic situations. At present, it is a most important commercial crop for the growers. It has not only high market value from the produce because of its huge industrial usages, but it is also the most suitable crop to adjust in various cropping systems practiced by the farmers. Its productivity potential is comparatively higher than other pulse and oilseed crops grown during rainy season in the state. Besides seeds, its green plants can also be fed as nutritional fodder to the livestocks. The rainfall pattern (its-intensity, distribution and duration) in the state is most uncertain and often erratic. Soybean can be grown more successfully under both excessive and low rainfall situations than other crops due to its wide adaptability. Generally, agroclimatic features of Sagar region in the state provide wide scope to encourage the cultivation of soybean among the farmers. For this purpose, a suitable production technology of soybean should be given to the farmers of the region having varying socio-economic status.
Preparation of land to provide optimum seedbed is of prime importance in farming system. The basic requirements for a good seed-bed are that the seeds should be placed at a uniform depth, in good contact with the soil so that it can take up water easily, and the soil must be well aerated. The soil above the seeds must remain sufficiently loose for the seedling to grow-up through the soil; and the pore space around the seeds must contain sufficient macro pores to maintain good aeration and to allow the easy growth of the young rootlets. Further, the seed-bed should be free from weeds. Weeds cause competitive effects on crop plants starting from germinating young seedlings stage and then, reduce the yield attributing characters at peak and advanced growth stages. For preparation of suitable seed-beds, lands are tilled with different types of implements viz., ploughs, cultivators, harrows, and rolls etc. Different tillage operations practiced for seed-bed preparation require high monetary investment. More often, the soil structure is impaired to some extent when heavy mechanical operations are practiced on the soil surface. Stability of soil structure decreases to a greater extent with the use of various tillage operations. The proportion of smaller aggregate size fraction increases in the soil resulting in poor aeration and permeability of water because of repeatedly heavy tillage operations. Pattersen et al. (1980) have also emphasized that land preparation with
repeated use of heavy implements at lower soil-depth not only needs a very investment of money and energy, but it damages the stability of soil structure also. They further, suggested to practice light, shallow and minimum tillage operations for seed-bed preparation to safeguard the soil structure.

At present, there is universal tremendous energy crises as a result of increasing demand of petroleum products particularly due to use of diesel in mechanical operations in land preparations. Under such circumstances, direct seeding on weed-free soil surface obtained by the use of herbicide to destroy the existing weeds may be one of the best alternatives. Hughes and Baker (1977) have also experienced that direct seeding under zero-tillage condition may be an ideal technique which helps in retaining more desirable soil structure particularly under intensive cropping situations. Hence, this field deserves critical investigations.

Generally, drilling of seeds in rows at desirable spacing and depth is considered to be a good method of sowing for most of the crops. This method of sowing results good germination and provides congenial micro-ecosystem for the good growth and ultimately yields. Besides these, manual weeding and intercultural operations could be easily followed in line sown crops. On the other hand broadcast method of sowing is in vogue, because this practice is easy, cheap and time saving. Thus, it is necessary to
determine the merits and demerits of both methods of sowing critically under adequate tillage and zero tillage situations in the interest of cultivators of various socio-economic categories.

A typical statement often heard is that the leguminous crops carry nodules on their roots, which fix nitrogen and therefore legumes raise the nitrogen status of the soil. This statement is only doubtfully true for the cultivated legume crops like peas, soybeans, groundnuts etc., because even if their roots are well nodulated, when they are growing in good farming situations, a large portion of nitrogen they have fixed is removed from the land by crop harvest. Thus, application of nitrogen through fertilizers to these legume crops provide effective yield advantages.

Recently specific rhizobium strains for particular leguminous crop have been identified and they are being commercially manufactured in suitable artificial media. Inoculation of these rhizobium cultures on the surface of dry seeds just before sowing is helpful for increasing the productivity of legume crops (Jone, 1974 and Russell, 1977). These rhizobium cultures are quite cheaper than nitrogenous fertilizers and their application is also easy.

Many research workers have emphasized that the use of suitable rhizobium inoculum is equal to application
of about 20-25 kg N/ha with regard to yield of soybean (Subba Rao, 1975 and Rao and Sharma, 1978). The performance of inoculation or nodulation activity in legume crops depends on the physiological condition of the crop plants, soil conditions (soil-moisture, soil temperature, aeration and organic matter content etc.), strain of bacteria forming the nodules and parasites in the nodules etc. Since, all these factors have diversities under different farming situations, hence, an systematic research approach should be made to find out the comparative performance of inoculation and nitrogen fertilization either alone or in combination of both under agro-climatic conditions of Sagar region.

Keeping the above facts in the mind, the present investigation entitled "Effect of soil tilth, seed inoculation and sowing methods on growth and yield of soybean (Glycine max. Linn. Merrill)" have been carried out with the following objectives:

1. To find out the ideal and economic tillage operation for soybean cultivation.

2. To assess the influence of line sowing v/s broadcasting method of sowing for growth and yield of soybean.

3. To determine the economy of nitrogen by rhizobium inoculation in soybean.

4. To workout the production of soybean under different tillage and sowing methods.
5. To determine the growth pattern of soybean under different soil tilth, sowing methods and nitrogen application.

6. To evaluate the quality of seeds under different treatments.

7. To study the nutrient status of soil after the harvesting of soybean.

8. To estimate the economics of different treatments.