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YIELD MAXIMIZATION OF PIGEONPEA THROUGH INNOVATIVE TECHNOLOGY OF SYSTEM OF PIGEONPEA INTENSIFICATION- A SUCCESS STORY

Success Story

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ABSTRACT

Pigeonpea being is kharif crop and their yield potential was affected by climate aberrations. In this situation plant population was not maintained/ survived until maturity as per recommendation due to uncertainty / heavy precipitation of rainfall. Under such circumstance maintaining adequate number of plants by transplanting of young seedling of pigeonpea in presence of both a biotic and biotic stresses. Counter of this problems and exploit full potential through certain crop contingencies including transplanting of pigeonpea seedling in main field so as to maintain adequate plant population for compensating yield loss during *Kharif* season. Resulted that higher yield, net return and cost benefit ration was found 15.2 q/ha, Rs.29340, BC ratio 1:2.5 respectively under transplanting of pigeonpea seedling as compared farmers practices 9.6 q/ha, Rs. 15120, BC ratio 1.1.96 respectively. Farmers responded positively to the results of the demonstration and those who participated in the demonstration trainings were willing to adopt System of Pigeonpea Intensification. And scientist advises to adopt this module for small and marginal farmers with less land to take advantage of this method as this method can yield dramatic results with less number of seeds and saving of water and nutrients.

Introduction

Pulse crops play a vital role in the national economy of India and considered as a main source of protein for human diets. Among the pulses, the pigeon pea is an important pulse crop being cultivated in 3.8 million hectares with an annual production of 2.4 million tones. However, national productivity of pigeon pea is quite low (780 kg/ha) as against their yield potential. In contrast, the productivity of pigeon pea crop in Panna district of Madhya Pradesh is about 953 kg/ha which is slightly greater than the national productivity, however lesser than the yield potential of the crop. There are several constraints for low productivity of pigeon pea in Panna district such as maximum area under rainfed conditions, sowing of pigeon pea through broad casting /line sowing without row and plant spacing arrangement. Sowing of pigeon pea at early or late onset of mansion therefore germination and growth was adversely affected by moisture stress or excessive moisture. Besides these if sowing of pigeon pea at late onset on monsoon then late maturity of this crop. This was adversely affected by frost during last week of December to first week of January month. During Kharif season in Panna district, pigeon pea crop suffers with moisture stress or excessive moisture and frost at flowering to pod formation stage. The major agronomic constraint for low productivity in pigeonpea due to low plant population in both situations. And Soil moisture related limitation is the major constraint to higher productivity of pigeonpea in Panna District. The excess moisture or moisture stress conditions during monsoon season creates unfavorable conditions for its growth by reducing aeration, nutrient uptake, nodulation, and creates favorable environment for disease incidence resulting in reduced crop stand and poor yield. As a consequence of both abiotic and biotic stresses and seedling mortality, the plant population gets considerably reduced. Thus, maintaining adequate plant population/crop productivity in presence of both *abiotic* (excess soil moisture, reduced aeration, severe

weed competition and nutrient stress) and *biotic* stresses (hampered nodulation and biological N fixation, seedling blight and wilt) pose a major challenge which needs to be tackled up strategically. Another constraint is delayed planting due to late onset of rains. On the contrary, early sowing of pigeonpea ensures higher yield as it ensures in providing opportunity for full vegetative growth of pigeonpea varieties. However, many a time during early *Kharif* season, there is a stray cattle menace in the field damaging the early sown crop due to absence of other crop(s) in the field. Hence sowing early is sometimes not feasible and viable as the benefits of early sowing in pigeonpea could not be realized. Thus, the need for timely planting through alternate feasible means such as transplanting is felt essential. In this situation Krishi Vigyan Kendra Panna introduce the production technique of system of pigeon pea intensification along with medium duration Variety(TJT-501). In this methods Pigeonpea transplanting is such a strategy towards fulfilling this objective of maintaining a good initial plant stand during early in the season for improving its productivity wherein seedlings are raised in the polythene bags in nursery and transplanted in the main field after a certain age. As established seedlings, these picks up growth quickly under field condition and can be more competitive. Moreover, raising pigeonpea seedlings well in advance and transplanting in the field later on receipt of good rains would help in reaping the benefits of early sowing with higher yield than direct sown or direct seeded pigeonpea. The information on transplanting pigeonpea in the context of its nursery raising methodology, optimum age of pigeonpea for transplanting and main field configuration is very limited. Therefore, to study the feasibility and refine the suitability of pigeonpea transplanting technology both from economics and adoptability considerations, Pigeonpea seeds were treated with *Rhizobium* and PSB at the rate of 500g/ha (both the biofertilizers) before sowing. For raising of seedlings the following practice was adopted. Pigeonpea seeds were sown in black /white polyethylene covers (size 20 x 8 cm with embedded holes) during July by filling soil and well decomposed farm yard manure (FYM) at 2: 1 ratio; and regular watering was done to raise seedlings upto 4 weeks (as per treatment) in the nursery. After germination, only one seedling per bag was maintained by thinning at 10 days after sowing (DAS). On the day of transplanting, varying age of pigeonpea seedlings 4 weeks of seeding were transplanted at a row spacing of 90 x 50 cm. Conventional direct line sowing at main field was taken as a control plot. Transplanting of pigeonpea at depth of 15-20 cm or 15-20 cm ridges were made as per treatment on separate plots and then pigeonpea seedlings were transplanted after removing the polythene cover without disturbing the soil near root zone of the pigeonpea seedling. The inter- and intra-row spacing followed for pigeonpea in all the cases was 90 x 20 cm. Well decomposed FYM @ 5 t/ha was applied two weeks before sowing in the entire field and incorporated into the soil for better crop survival, care and management. Half of both urea-N and MOP-K along with recommended dose (full) of P and Zn were applied at the time planting. The rest of N and K were applied in two equal splits coinciding with irrigation at branching and pod development stages of the crop. Furrow irrigation was applied at both branching and pod development stages depending upon deficit of rainfall during these stages. Normal practice of crop husbandry was followed for a successful crop raising. The crop was harvested during mid April in 2012 and 2013. Soil moisture samples from 0-60 cm soil profile were taken for analysis of moisture content. Data related to biometrics, seed yield, yield attributes, economics (and others efficiency parameters) recorded during both the years were subjected for appropriate statistical analysis and interpretation.

The average yield was found (13.9 q/ha) under improved variety along with improved technology of System of pigeonpea intensification. In this regard Mr. Sushil Bajpai, a progressive farmer adopted the improved production technology system of pigeonpea intensification along with improved variety (TJT-501) of pigeonpea crop and received the higher production (15.2 q/ha) as well as net income and cost benefit ratio Rs. 29340/ha and 1:2.5 respectively as compared to traditional system of farming (9.6 q/ha, Rs. 15120/ha and 1:1.96 respectively).

Table 1. Economic analysis of the technology

Sl. No.	Particulars	Improved Practices	Farmers Practices
1.	Technology used	Improved variety (TJT-501) along with system of pigeonpea intensification	Traditional broad casting/line sowing
2.	Cost of cultivation (Rs./ha)	Rs. 19300.00	Rs. 15600.00
3.	Productivity (Q/ha)	15.2 q/ ha	9.6 q/ ha
4.	Gross Income (Rs./ha)	Rs. 48640.00	Rs.30720.00
5.	Net Income (Rs./ha)	Rs. 29340.00	Rs. 15120.00
6.	B:C Ratio	1:2.5	1:1.96

Fig 1. Filling of poly thin bag

Fig 2. Prepared seedling

Fig 3. Transplanting of pigeonpea seedling

Fig 4. Active vegetative growth stage

Thus cultivation of pigeonpea crop using improved cultivar (TJT-501) along with appropriate production technology (SPI) brought out the changes in social and living status of the farmer. Similar growths were also recorded in other crops which also impart improvement in economic condition of the farmer by providing technical assistance by the scientists of KVK at regular interval.

Conclusion

Yield and net return maximization in per unit area of pigeonpea through a new concept on low input technology is known as System of pigeonpea intensification for increasing their yield. Because System of pigeonpea intensification has a number of advantages and includes the need for less number of seeds for sowing, low use of water and nutrients, easy

in sowing by manual dibbling in poly bags and harvesting more production. Besides these its technique is suitable in both abiotic and biotic stresses. Because seedling mortality is negligible due to transplanting of young seedling of pigeonpea, Thus, maintaining adequate plant population/crop productivity in presence of both *abiotic* (excess soil moisture /ponding water, reduced aeration, severe weed competition and nutrient stress) and *biotic* stresses (hampered nodulation and biological N fixation, seedling blight and wilt). Therefore advises to adoption of this module for small and marginal farmers with less land to take advantage of this method to increase yield with less number of seeds and saving of water and nutrients.

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