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Productivity and economics of pigeonpea as influenced by planting geometry, growth retardant and genotypes

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Pigeonpea is an important pulse crop of India with > 90 per cent contribution to the world's pigeonpea production. As pigeonpea has intermediate growth habit, it is required to restrict its vertical vegetative growth and increase horizontal growth by increasing secondary branches which in turn increase the reproductive sink (pods) and increase the yield. Nipping is removal of top 4-5 cm portion of shoot at 50 days after sowing which results in sprouting of secondary and tertiary branches in pigeonpea which is tedious process and requires more number of labour. Hence, it is advised to use growth retardant for better source- sink relationship and better fruit retention in pigeonpea (Kaur *et al.,* 2013). Chlormequat Chloride is well known growth retardant and is quickly metabolized by plants, animals, and soil microbes contained to other growth retardant. Since limited information available on these aspects in pigeonpea, an experiment was planned to study the effect of growth retardant and planting geometry on yield and economics of pigeonpea genotypes

METHODOLOGY

A field experiment was conducted at Main Agricultural Research Station, Dharwad during kharif seasons of 2013 and 2014 to evaluate the performance of pigeonpea genotypes at different planting geometries and nipping methods. An experiment comprising of twelve treatments was laid out in split plot design with three replications. Treatments were comprised of two genotypes (BSMR-736 and TS-3(R),three planting geometry (90x20, 120x20 and 150x20cm) and three nipping practices (without nipping, with nipping and chlormequat chloride spray @ 3ml/l as growth retardant).

RESULTS

Pooled data of two years indicated that planting geometry of 120cm x 20 cm was significantly superior (2408 kg/ha) over 90 X 20cm (2075kg/ha) and 150 x 20 cm (2078 kg/ha). The spacing of 150 x 20 cm registered maximum number of pods/plant (322). It was due to the fact that wider spacing has registered more number of primary and secondary branches/ plant which enhanced the more number of pods/plant. Similarly 100 seed weight was also more in 150 x 20 cm spacing regime than 90 x 20 cm and 120 X 20 cm. Since the plant population was less in 150 X 20 cm (33, 333) compared to 120 X 20 cm (41,666), yield was not compensated. Spraying of growth retardant chlormequot chloride recorded significantly higher yield (2343kg/ha) over nipping at 50 DAS (2120kg/ha) and without nipping (2180kg/ha). The increase in yield was due to increase in no. of branches, flowers and pods. This was also observed by Tripathi *et al*. (2009). Genotype BSMR -736 recorded significantly higher yield (2308 kg/ha) than TS-3 (R) (2066 kg/ha). This was attributed to its longer duration (170 days) compared to TS- 3 (150 days). It had opportunity of longer period for the development of reproductive parts. Hence more number of pods per plants.Net returns and B:C ratio were significantly higher with pigeonpea when planted in 120 cm x 20 cm and sprayed with chlormequot chloride at 70 DAS. It can be concluded that pigeonpea can be grown profitably with 120X20cm spacing and sprayed with chlormequot chloride spray at 70days after sowing in norther transition zone of Karnataka.

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Study of IPNS on soil properties under rice - wheat cropping system at Kymore Plateau and Satpura Hills zone of Madhya Pradesh

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Integrated nutrient management system is an important component of sustainable agricultural. The goal of INM is to integrate the use of all natural and man-made resources of plant nutrients, so as to increase crop productivity in an efficient and environmentally benign manner without diminishing the capacity of the soil to be productive for present and future generations. It seeks to maintain or improve soil fertility for sustaining the desired level of crop production and crop productivity through optimization of the benefit from all possible sources of plant nutrients in an integrated manner. The INM is made up of components, which possess great diversity in terms of chemical and physical properties, nutrient release efficiencies, positional availability, crop specificity and farmer's acceptability. The study was conducted to evaluate the productivity of rice-wheat cropping system under varying IPNS on long-term basis and to monitor the long-term effects of fertilizers and organic manures on soil properties under varying IPNS in rice-wheat cropping system

METHODOLOGY

Continuous field experiments of 30 years (1984-85 to 2014-15) were conducted at AICRP on Integrated Farming Systems at Research Farm, Department of Agronomy, JNKVV, Jabalpur (MP). Twelve treatments consisted with control (no fertilizer & organic manure, 50+50%, 50+100%, 75+75%, 100+100% RDF to both rice and wheat crop and INM treatment of 50 % N by FYN to rice+50%RDF to wheat, 25%N by FYN to rice+75%RDF to wheat, 50 % N by wheat straw to rice+50%RDF to wheat, 25%N by wheat straw to rice+75%RDF to wheat, 50 % N by green leaf manuring of sunhemp to rice+50%RDF to wheat, 25%N by green leaf manuring of sunhemp to rice+75%RDF to wheat and farmer practices ($N_{40}P_{20}$+ 3 ton FYM to both crop) were tested in randomized block design with four replications. Rice cv. Kranti was grown under transplanting method with 20cm X 15cm planting geometry and then succeeding wheat cv. Lok 1 was grown by drilling 100 kg seeds/ha in rows 20 cm apart. The 100% recommended dose of NPK was 120 kg N + 60 kg P2O5 + 40 kg K_2O/ha to both crops. The crops were grown under assured irrigation as per needs of crops. Other cultural practices viz. weed management and plant protection measures were followed as per recommendations to both crops in the state.

RESULTS

The result of experiment revealed that, the changes in different physical, chemical and biological properties of soil over their parental status were positive under different INM treatments. Though soil pH and EC maintained stability as per their initial status under all nutrient management consisting with application of fertilizer alone or in combination with various organic sources viz. green manuring with sunnhemp, FYM or wheat straw. The OC and available N, P, K, S and Zn contents and microbial population deviated from their initial status after completion of 30th crop cycle under rice-wheat system due to effect of different treatments. All these soil parameters deteriorated under those treatments, where crops were grown continuously for 30 th years without use of any fertilizer/manure or with the use of fertilizers at varying rates. However deterioration in these parameters except to P and K status was not much, when 100% NPK were applied to both crops. However, the treatments receiving different IPNS showed a rising trend in OC, N, Zn and S contents and almost stabilized the P and K contents in soils. The IPNS treatments also showed rising trend in the buildup of fungi, bacteria. PSB, azotobacter and actinomycetes population.

CONCLUSION

A saving of 50% NPK fertilizers could be achieved through different IPNS including integrated use of green manure or FYM or wheat straw with fertilizers by giving sustainable high productivity in rice-wheat system due to improvement in soil-health on long run basis. Different IPNS including integrated use of green manure or FYM or wheat straw with fertilizers improved the OC and N contents as well as microbial population in soil at the end of 30th crop cycle over their initial status.