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Effect of organic manure and spacing on growth and yield of chickpea (*Cicer arietinum*)

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Abstract
Background: A field experiment was conducted to know the Effect of Organic Manure and spacing on Growth and Yield of Chickpea 2023. The experiment was laid out in a RBD (Randomized block design) consisting of ten treatments with 3 replications. Treatments included were three levels of fish extract (5 ml, 15 ml, 25 ml/ ltr water) and three different spacings (30 × 10, 35 × 10, 40 × 10). The statistical analysis indicated that growth was significantly influenced with application of fish extract and spacing. The characters plant height, number of branches per plant, number of pods per plant, number of seeds per pod and test weight were exhibited best results with the treatment T8. Present investigation, therefore, indicated better response of the plants towards application of Fish meal 25 ml/ltr water + 35 × 10 cm which was found to be most remunerative with regard to their growth of Chickpea.

Keywords: Spacing, fish extract, chickpea

Introduction
The scientific name of the chick pea is *Cicer arietinum.* It belongs to the family Leguminosae and sub family Papilionaceae. Chick pea is also known as Bengal gram (or) Chana. Chickpea is originated from south west Asia. The oldest pulse cash crops cultivated throughout India is chickpea. It is called as the king of pulses, It is commonly used as vegetable crop and also as fodder crop. It contains a protein content of 22-23%. The chromosomal number of chick pea is 16. It is a self- pollinated crop and the gram fruit is known as pod. In world 14.56 million hectares of land area is under the production of chickpea. In India the area under production of chickpea is 6.3 million hectares. In Andhra Pradesh chickpea cultivated area is occupied by 4.74 lakh hectare.

Some of the important chickpea producing countries are Mexico, Pakistan, Burma and Turkey. Major chickpea growing states in India are Madhya Pradesh, Rajasthan, Maharashtra and Uttar Pradesh. Chick pea is a dry land crop (best variety: C-235) and has a tap root system. The main two varieties of chickpea are desi (Pusa-256, RS-10, RS-11) and kabuli (C-104, K-4, L-144). Seed rate required for desi variety per hectare is 90-105kg and for kabuli per hectare is 135-210 kg. The optimum time of sowing of chickpea is second fortnight if October. The sowing depth should be maintained a minimum of 8cm to control the incidence from wilt disease. The spacing followed is 30 cm x 10 cm (row to row). Pre flowering and pod development stages are the critical stages of irrigation in chickpea. The required recommendations of nutrients for chickpea includes 20-30 kg nitrogen per hectare, 40-60 kg of phosphorus per hectare and if soils are deficient in potassium 17-25 kg/ha is recommended. Pre - emergent herbicides are used by chickpea growers for weed management in early stages. In world 15 million tonnes of chickpea was produced in the year 2020. The production of chickpea in India is 6 million tonnes. It is valued for its nutritive seeds with an inexpensive and high quality source of protein (12-22%), carbohydrate (52-70%), fat (4-10%), crude fibres (1.37%), lysine (195-205 mg), carotene (89-94 mg), fat (3%), minerals (calcium, magnesium, phosphorus, iron, zinc) and vitamins [Samah N 2018] [4].

Benefits of Fish Meal
1. Fish meal provides nutrients such as nitrogen phosphorous and potassium.
2. It also provides vitamins and minerals such as iron and calcium in low amounts.
3. Fish meal provides food for micro bacteria present in the soil and it improves the growth of the plant.
4. It works as an important fertilizer and also improves the soil fertility.

5. Fish meal improves the germination % of the crop and pod formation.

Material and Methods

The experiment was conducted to know the Effect of Organic Manure and spacing on Growth and Yield of Chickpea (Cicer arietinum.) was carried out at Crop research field, Ideal college of arts and sciences (Vidyut Nagar, Kakinada), Affiliated by Adikavi Nannaya University, Andhra Pradesh, during 2023. The experiment was laid out in a RBD (Randomized block design) consisting of ten treatments with 3 replications, with the treatment combinations, T1 - Fish meal 5 ml/ltr water + 30 × 10 cm, T2 - Fish meal 5 ml/ltr water + 35 × 10 cm, T3 - Fish meal 5 ml/ltr water + 40 × 10 cm, T4 - Fish meal 15 ml/ltr water + 30 × 10 cm, T5 - Fish meal 15 ml/ltr water + 35 × 10 cm, T6 - Fish meal 15 ml/ltr water + 40 × 10 cm, T7 – Fish meal 25 ml/ltr water + 30 × 10 cm, T8 - Fish meal 25 ml/ltr water + 35 × 10 cm, T9 - Fish meal 25 ml/ltr water + 40 × 10 cm, T10 – control.

Preparation of Fish Meal Ingredients

1. Fish waste (2-3 kg)
2. Jaggery (1.5-2 kg)

Preparation

1. Fish meal can be prepared by drying, grinding and pressing of fish waste into a solid or liquid.
2. Two or three kgs of fish is required to make 1kg fishmeal.
3. Take 2-3 kgs of rotten fish guano and fish waste.
4. Mix 1-1.5 kg of crushed black jaggery for every 5 minutes of continuous stirring in clockwise or anti-clock direction.
5. Cover the container tightly to prevent entry of air.
6. Stir the mixture twice a day for 1 week.
7. In the end, add 500 g of jaggery to the solution and leave it for 2 days.
8. Recommended spray of fish meal, @ 200 gm/10 litres of water.

Results and Discussion

Parameters

The perusal of data indicate that plant height measured at different growth stages (i.e., 60 DAS) was influenced markedly by the application of different levels of neem spray and spacing, though, numerical increase in plant height was recorded in dose dependent manner. The maximum value of plant height (72.00 cm) and number of branches per plant (15.00) were recorded with the application of highest level of Fish meal 25 ml/ltr water + 35 × 10 cm (T8) and the lowest value in this regard plant height (64.00 cm) and branches (11.00) were recorded in control (T0), The recorded data indicated that each level of neem spray and fish extract had markedly influence on number of Pods per plant. It was found to be increased with the increasing fish extract levels and spacing in a dose dependent manner. The maximum number of pods per plant (21.00) was recorded with the highest level of (T8) Fish meal 25 ml/ltr water + 35 × 10 cm and minimum value (16.00) in this regard was recorded in the control plot T10 (control). A closer review of data revealed that application of organics markedly influenced on growth parameters which increased sequentially with wider spacing. The highest level (T8) Fish meal 25 ml/ltr water + 35 × 10 cm recorded maximum number of seeds per pod (3.00) whereas, the lowest value in this regard (1.00) was observed in Fish meal 25 ml/ltr water + 40 × 10 cm, and highest test weight was recorded in (T8) Fish meal 25 ml/ltr water + 35 × 10 cm (31.46 g), and minimum was recorded in Control.

Table 1: Effect of Organic Manure and spacing and their combination on growth of chickpea

Treatments	Plant Height (60DAS)	Number Of Branches (AT 60 DAS)	Number of pods per plant	Number Seeds per pod	Test weight
T1	5.00	14.00	17.00	1.00	28.04
T2	66.00	14.00	18.00	2.00	29.00
T3	62.00	12.00	14.00	1.00	28.21
T4	67.00	14.00	19.00	2.00	29.35
T5	67.00	15.00	19.00	2.00	29.76
T6	62.00	13.00	14.00	1.00	27.00
T7	70.00	15.00	20.00	2.00	31.01
T8	72.00	15.00	21.00	3.00	31.46
T9	64.00	13.00	16.00	1.00	27.12
T10	64.00	11.00	16.00	2.00	28.00
F test	S	S	S	S	S
SE. m	0.95	0.23	0.35	0.03	0.51
C.D	2.85	0.70	1.06	0.10	1.53

Discussion

Optimum plant population density is an important factor to realize the potential yields as it directly affects plant growth and development of chickpea [Islam MS 2008] [1]. Earlier studies show that chickpea yields are remarkably stable over a wide range of population densities. The plants are able to fill available space by initiating lateral branches and, thus, can compensate for poor emergence and thin stands. Increasing row spacing significantly influenced of growth, yield attributes and yield characters. Number of plants per unit area influenced plant size, yield components and ultimately the seed yield. Both over and under plant densities resulted significant yield decrease [Reja MS 2020] [3]. The 100 seed weight was noted higher in wider spacing and it decreased with lower in spacing. Maximum 100 seed weight (21.45) was recorded under spacing of 50 cm which was at par with 40 cm spacing (21.40). Minimum 100 seed weights were observed under 30 cm spacing (20.96) with significant difference. Increase in row spacing resulted in increasing 100-seed weight in general. This is because of efficient utilization of nutrient, water and solar radiation at wider row spacing as compared to narrow row spacing. Increase in yield attributing characters with increase in row spacing has also been reported by Mondal (2000) [5].

Conclusion

From the present investigation concluded that among all the treatments considered the treatment with (T8) Fish meal 25 ml/ltr water + 35 × 10 cm resulted into maximum increase in vegetative and reproductive growth of Chickpea. It may, therefore, be concluded on the basis of the present findings that the application of Fish meal 25 ml/ltr water + 35 × 10 cm along with the basal application of farm yard manure resulted in better germination.

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