Growth and yield of lentil (*Lens culinaris* Medik.) under different sowing dates and tillage systems

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Abstract: An experiment was carried out during *Rabi* season 2007-08 at Khalsa college Research Farm, Amritsar (Punjab) to study the effect of different sowing dates and tillage systems on growth and yield of lentil (*Lens culinaris* Medik.). Sowing dates for lentil were 15th October, 30th October, 14th November and 30th November. Tillage systems were no tillage (Crop sown directly without ploughing), minimum tillage (Crop sown with one ploughing followed by planking) and conventional tillage (Crop sown with three ploughings followed by planking). Sowing on 30th October was found to increase growth parameters as dry matter production (6.89%, 17.72%, 33.81%), plant height (2.13%, 6.75%, 11.86%), branches/plant (6.20%, 25.46%, 64%) and yield (14.09%, 44.10%, 189.73%) on 15th October, 14th November and 30th November. Tillage also had significant influence on growth parameters and yield. Conventional tillage has increased dry matter production (6.70% and 13.63%), plant height (1.55% and 4.79%), branches/plant (3.77% and 6.54%) and yield (8.09% and 30.65%) over minimum tillage and no tillage. The highest yield was recorded with the treatment that received conventional tillage.

Key Words: Lentil, Tillage systems, Sowing dates


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INTRODUCTION

Lentil is a most nutritious *Rabi* pulse and is an excellent supplement to cereal based diets. It contains protein, carbohydrate, vitamin B, Iron, calcium, niacin and phosphorus. An adult needs about 85 g of pulses per day in a balanced diet. In purely vegetarian diet, the Food and Agriculture Organization and National Advisory Committee of India have recommended 104 g of pulses per capita per day under the minimum nutritional programmes.

The increase in pulse production is important because substantial portion of the protein is derived and consumed from the pulses, moreover the problem of malnutrition and ever increasing population has made it mandatory to increase the pulse production by precision farming hence availability at low price.

In Punjab, agriculture is of intensive in nature and rice-wheat rotation is dominating the agriculture scenario and besides its contribution of food grain it created many problems like depleting of soil water, weed infestation and deterioration in soil health, attack of insect pests, diseases, intensive use of energy and marketing problems. Pulse cultivation seems to be viable and economical solution to overcome these problems because of nitrogen fixation, low water and weedicide requirement. Further the cost of lentil cultivation can be minimized by adopting no tillage.

The timely planting of any crop is important for better plant growth, development and grain yield. With suitable residue management, zero tilled fields can be sown timely than conventional tilled fields. So it is imperative to find out optimum sowing time for maximum yield potential of lentil.

Since the information on the effect of sowing dates and tillage systems on growth and yield of lentil is meagre, the present investigation was undertaken.

MATERIAL AND METHODS

A field experiment was conducted at Khalsa College Research Farm, Amritsar during *Rabi* 2007-08. The experiment was laid out in Randomized Block Design with three replications. The soil was sandy loam, low in organic carbon, medium for available nitrogen and phosphorus, but rich for
available potassium (Table A).

Lentil LL699 was sown after pre-sowing irrigation in rows spaced 22cm apart on experimental dates using tillage methods as per the treatments. A basal dose of 12.5kg N and 20kg P₂O₅/ha was applied at sowing. The rainfall received during 2007-08 was 71mm.

**RESULTS AND DISCUSSION**

The results of the present study have been presented and discussed under the following headings:

**Effect of sowing dates:**

Sowing dates had significant effect on growth attributes characters. In case of growth attributes early sowing dates 15th October and 30th October were at par with each other and took less number of days to emergence than later sowing dates 14th November and 30th November (Fig. 1). This might be due to higher soil temperature during the early sowing dates. These findings are in conformity with Edwards and Martin (2007). Early sown crops attained more vegetative growth. 30th October gave significantly higher plant count/m² followed by 15th October and 30th November (Fig. 2). However 30th October and 14th November were at par. Early sowing dates 15th October and 30th October were significantly superior with regard to plant height, dry matter production, branches/plant and grain yield (Fig. 3, 4, 5 and 7). 30th October sowing counted the minimum sterile pods followed by 15th October, 14th November and 30th November (Fig. 6). All differed significantly except 15th October and 30th October which were at par. This was due to the optimum temperature and longer time span available for plant growth. These findings are in conformity with Srivastava (1979) and Chovatia et al. (1993). High seed yield from October sowings were due to warmer air temperatures during the early vegetative growth. According to Gurung et al. (1996) the other reason was due to extended total growth period which was important for

<table>
<thead>
<tr>
<th>Depth in cm</th>
<th>pH</th>
<th>Electrical conductivity (mm hos/cm)</th>
<th>Organic matter (%)</th>
<th>Available nutrients (kg/ha)</th>
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<tr>
<td></td>
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<td>390</td>
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<tr>
<td>15-30</td>
<td>8.5</td>
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<td>130</td>
<td>0.34</td>
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Table A: Chemical analysis of soil

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Fig. 1: Effect of sowing dates and tillage methods on days takes to emergence of lentil

Fig. 2: Effect of sowing dates and tillage methods on emergence of lentil count/m² of lentil

Fig. 3: Effect of sowing dates and tillage methods on plant height (cm) of lentil

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more solar radiation interception and greater dry matter accumulation. Thus, early sowing dates contributed to better utilization of growth resources which results in higher yield. This was also reported by Singh et al. (2005)

**Effect of tillage:**

Conventional tillage proved significantly superior with regard to growth attributes and yield. All the growth parameters were significantly improved by conventional tillage over no tillage. CT and MT gave higher emergence count/m² and took less number of days to emergence as compared to NT and were at par with each other (Fig. 1 to 2). This was possible due to low resistance offered by loose soil to the growing seedlings. These findings are in line with those of Balusamy et al. (2003) and Blackshaw et al. (2007). Conventional tillage and minimum tillage were at par in case of plant height and branches/plant. No tillage reduced plant height, dry matter production, branches/plant which results in lower grain yield (Fig. 3, 4, 5 and 7). The significantly lower numbers of sterile pods were noted with conventional tillage than minimum tillage followed by no tillage (Fig. 6). Guy et al. (2001) reported that several factors contribute to the reduced yield including cooler soil conditions, poor stand establishment and slow growth. According to Guy and Wu (2003), Balasubramanian et al. (2004), Nieya et al. (2005) and Blackshaw et al. (2007) reduced early growth in no tillage was
due to cooler soil conditions probably contributed to reduced biomass and plant height. Low dry matter accumulation lead to lower seed yield. Lopez-Bellido et al. (2003) reported similar results. Improved rooting condition and water extraction in conventional tillage results in better plant growth and higher yield as reported by Izaurralde et al. (1995)

REFERENCES


WEBLIOGRAPHY
