

# LENTIL PRODUCTION IN CANTERBURY

B.A. McKenzie

Plant Science Department  
Lincoln College  
Canterbury, New Zealand.

## ABSTRACT

Lentils have provided Canterbury cropping farmers with a profitable alternative. Average farm yields are high at about 2 t/ha in most seasons. In most seasons the factor most limiting yield is the weather. In wetter than average seasons yields tend to be low due to crop lodging and disease. In dry seasons crops tend to be higher yielding. Sowing date has a significant effect on crop yield with autumn sowings having a higher yield potential than spring sowings due to increased radiation interception. Weed control is crucial to produce a high yielding lentil crop. Increased plant population can help control weeds, however, chemical control and paddock selection are important. Fungal disease can also reduce lentil yields. Since the crop is susceptible to most pea diseases rotations must be lengthy and control measures should be followed.

*Additional Key Words:* *Lens culinaris*, *esculenta*, *dahl*, *dal*.

## INTRODUCTION

Lentils (*Lens culinaris* Medik.) are a relatively new crop to New Zealand. As recently as 1980 there were only very small areas of lentils grown in Canterbury (Jermyn *et al.*, 1981). However, the area sown to lentils has increased significantly with approximately 4,500 ha sown in 1987/88 and about 3000 ha in 1988/89.

Worldwide lentil production is approximately 2.6 million t (FAO, 1987). The most substantial exporters are Turkey, Canada and the USA with total production levels of about 950,000, 328,000 and 81,000 t/annum respectively.

The potential for growth in lentil production in Canterbury is high and may be comparable to that of Canada where in 1979-81 only 38,000 ha of lentils were grown. By 1987, this had increased to 247,000 ha (FAO, 1987).

The crop seems very well suited to New Zealand conditions. At Lincoln College, over a number of seasons, average yields have been about 2,500 kg/ha (McKenzie, 1987) ranging from 700 kg/ha to 3,300 kg/ha. Farmer yields have in some seasons been as high as 4,000 kg/ha. While there are few statistics available on lentil production in New Zealand average

farm yields are about 2,000 kg/ha.

While large increases in the area sown to lentils will depend upon obtaining new markets, demand for the product is likely to grow. There is increased interest in reducing fat and cholesterol intake, in human diet, particularly in western countries. Lentils can form a significant component of the daily diet and their amino acid composition complements that of cereals (Savage, 1988). Additionally increasing the lentil proportion of the diet may allow a higher carbohydrate intake while excluding fat. This can help lower fasting serum cholesterol concentrations (Jenkins *et al.* 1980).

## HUSBANDRY

In most seasons, lentils are not difficult to grow. Perhaps the most important aspect is to choose a free-draining soil type. The crop is very susceptible to waterlogging.

Cultivar choice is also important. The most common cultivars grown in Canterbury are: Titore, a small seeded red lentil, and Invincible, Olympic and Eldorado, all large seeded yellow cultivars (Jermyn, 1987).

Recommendations for growing a high yielding lentil crop are given in Table 1.

**Table 1. Recommendations for growing a high yielding lentil crop.**

	Spring sowing	Autumn Sowing
<b>Sowing date</b>	May 15-June 15	Sow 5 September or as early as possible
<b>Seedbed</b>	fine and firm if weeds present spray with Roundup	fine and firm if weeds present spray with Roundup or Paraquat.
<b>Herbicide</b>	cyanazine pre-emergent	cyanazine pre-emergent
<b>Sowing rate</b>	50-70 kg/ha - Titore 70-100 kg/ha - Yellow varieties.	70-100 kg/ha - Titore 100-150 kg/ha - Yellow varieties
<b>Sow</b>	treated seed; use Tecto, Apron or Benlate and Captan sow 2-3 cm deep in 15 cm rows.	
<b>Roll</b>	with a heavy roller after emergence, before plants reach 7 cm in height.	
<b>Irrigation</b>	is not recommended and should only be used in very dry years or on crops sown on very shallow soils.	

## FACTORS AFFECTING CROP YIELD

In Canterbury the most significant factor affecting lentil yield is the weather. In wet seasons average farm yields may be as low as 1,000 kg/ha. This is primarily due to disease. However, in wet seasons, excessive vegetative growth is common and crops may lodge. This can be a significant problem with the large seeded yellow varieties. The problem is not usually found in spring sowings.

Generally dry seasons provide the highest lentil yields. However, the 1988/89 growing season was one of the driest on record. Lentil yields were very low that year and there were many crop failures. These failures were probably due to both a lack of available soil moisture and a failure of most herbicides due to insufficient soil moisture to activate the herbicide.

While farmers cannot control the weather, there are a number of factors the farmer can control to increase crop yield. These factors include: sowing date, weed control, choice of cultivar and disease control.

## SOWING DATE

Work at Lincoln University has consistently shown that autumn lentil sowings out-yield spring sowings. Results from an experiment in 1984/85 showed that all autumn/winter sowings produced at least 2,000 kg seed/ha while all spring/summer sowings produced less than 1,500 kg seed/ha (Figure 1). Autumn sowings have a higher yield potential than spring sowings because they intercept more solar radiation (McKenzie, 1987).

Autumn sown lentil crops close their canopies earlier and have a longer crop duration than spring sown crops.

Yields of spring sown crops can be increased by increasing the seeding rate (McKenzie, *et al.*, 1989). This results in increased radiation interception and reduced weed competition.

## WEED CONTROL

Effective weed control is essential for a high yielding lentil crop. Lentils are not a competitive crop and should not be grown in weedy paddocks. The

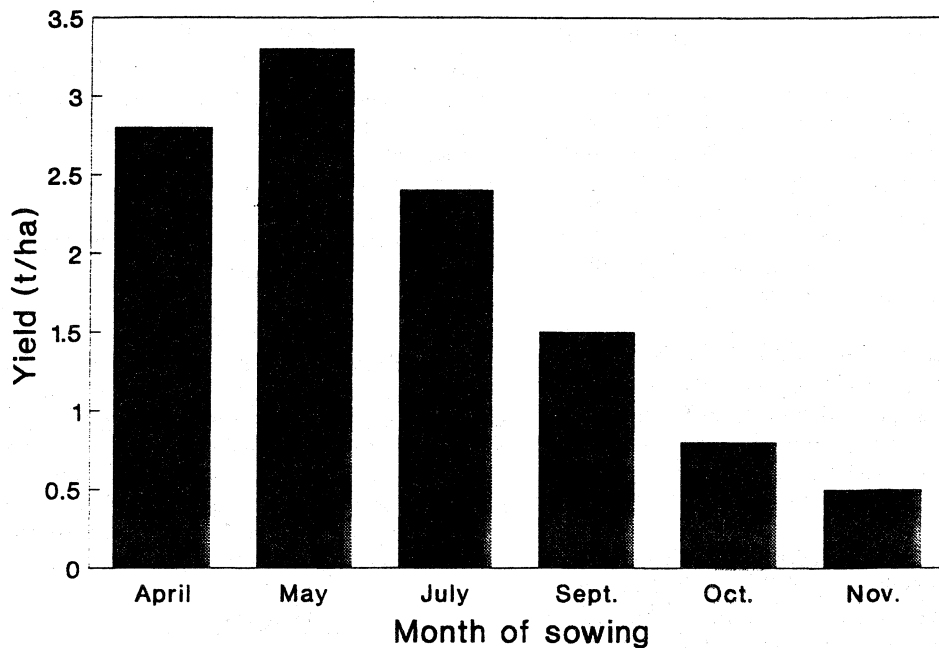


Figure 1. The effect of sowing date on seed yield of lentils

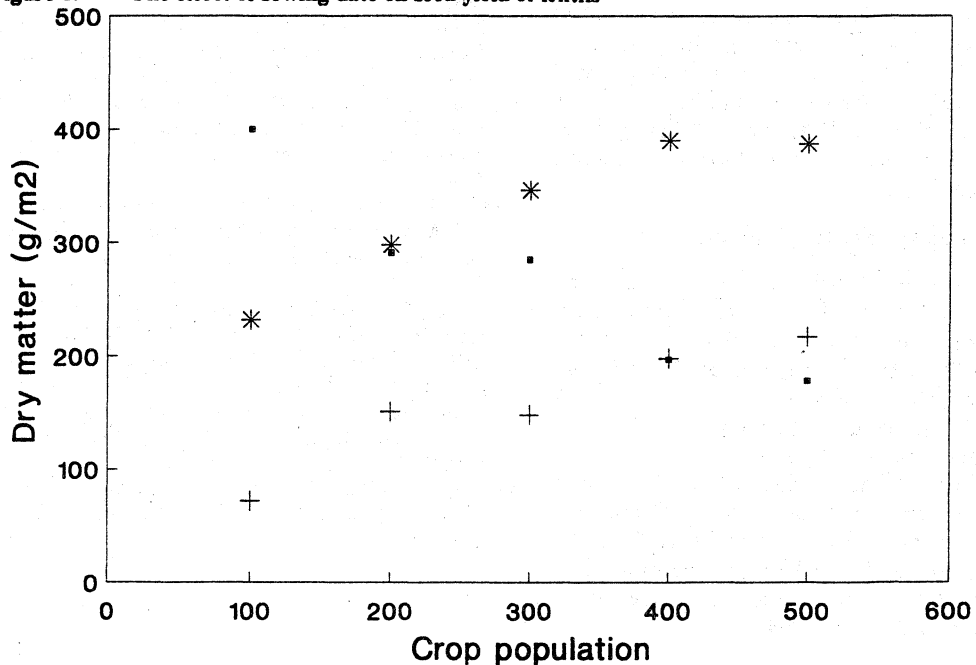


Figure 2. The relationship between crop population (plants/m<sup>2</sup>) and dry matter production of weeds (.), lentils (+), and weed free lentils (\*).

effect of weed and lentil population on lentil yield is shown in Figure 2.

While high lentil populations can reduce weed competition and increase yields, these high populations would also cause high establishment costs. In most paddocks, cyanazine will give good weed control when applied pre-emergent. Post-emergence the only chemical which seems to be effective is metribuzin. Care must be taken with this herbicide however as crop damage may occur.

### CULTIVAR SELECTION

This factor can have an important bearing on yield. In work at Lincoln, the small red lentil Titore has been shown to consistently yield more than any of the yellow varieties (McKenzie, 1987). This variety is a DSIR selection and is well suited to the Canterbury environment.

Among the yellow varieties Olympic has proven to be nearly as high yielding as Titore. It is also quite flexible and can be sown in autumn or spring. If spring sowing is necessary, Invincible is a suitable cultivar.

Trials with a new extra large seeded variety called Primera have proven disappointing with yields only about half of those of Titore. In areas of high rainfall or on moderately heavy soils, the yellow cultivars may be prone to lodging and excessive vegetative growth. Both of these characteristics tend to reduce harvest index and seed quality.

### DISEASE CONTROL

Lentils are susceptible to many of the same diseases which affect peas. Perhaps the most important of these is *Ascochyta fabae* f. sp. *lentis* (Jermyn, 1987). After the crop canopy closes disease spread can be rapid in damp weather. The very dense canopy inhibits penetration of sprays. This means the crop must be monitored frequently.

There are a number of other diseases which also affect lentils. These include: *Botrytis*, *Sclerotinia sclerotiorum*, *Pythium* and *Rhizoctonia*. Additionally *Aphanomyces euteiches* can be a problem and paddocks with an *Aphanomyces* index over 50 by MAF soil test should be avoided.

### IRRIGATION

Irrigation of lentils has been intensively studied at Lincoln University. With field grown lentils, there seems to be little response to irrigation even in dry seasons. On any soil type other than shallow stony soils irrigation is unlikely to give high seed yields except in the driest of years.

Irrigation tends to increase vegetative growth often with increased plant lodging and disease.

### CONCLUSIONS

Lentils clearly have a bright future in the cropping scene in Canterbury. They seem to be an ideal crop for the region particularly as irrigation water is likely to become less available and more expensive. There are no serious reasons why lentil production should not continue to expand rapidly in Canterbury. However, the rate of growth and the success of the crop will depend upon developing suitable markets.

### REFERENCES

- F.A.O. 1987. *FAO Production Yearbook 41*, 154.
- Jenkins, D.J.A., Wolever, T.M.S., Taylor, R.H., Ghatari, H., Jenkins, A.L., Barker, H. & Jenkins, M.J.A. 1980. Rate of digestion of foods and postprandial glycaemia in normal and diabetic subjects. *British Medical Journal* 281, 14-17.
- Jermyn, W.A., Goulden, D.S., Lancaster, I.M. & Banfield, R.A. 1981. Lentil evaluation in New Zealand. *Proceedings of the Agronomy Society of New Zealand 11*, 77-81.
- Jermyn, W.A. 1987. Lentils. In *Pulse Crops in New Zealand*. B.A. McKenzie & J.D. Pederson (Eds.). *Proceedings of the Pulse Crops Field Day, Lincoln College, 9 December 1987*, 32-33.
- McKenzie, B.A. 1987. The growth development and water use of lentils (*Lens culinaris* Medik.). Ph.D. thesis, Lincoln College, University of Canterbury, New Zealand.
- McKenzie, B.A., Miller, M.E. & Hill, G.D. 1989. The relationship between lentil population and weed biomass production in Canterbury. *Proceedings of the Agronomy Society of New Zealand 19*. (in press)
- Savage, G.P. 1988. The composition and nutritive value of lentils (*Lens culinaris*). *Nutrition Abstracts and Reviews (Series A) 58*, 319-343.