NAVY BEAN PRODUCTION IN CANTERBURY

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ABSTRACT

Navy beans have been shown to consistently produce up to 3 t/ha of dry seed in Canterbury. Experimental work has shown that to ensure high yields irrigation is essential. In a dry season irrigation can increase yield by up to 250 %. Crop husbandry is relatively simple. However, the mid to late November sowing date means the crop is exposed to the danger of both late and early frosts. The crop can provide a profitable alternative to Canterbury cropping farmers, however, it is only recommended to those with specialist cropping experience.

Additional Key Words: *french bean, kidney bean,* Phaseolus vulgaris.

INTRODUCTION

Until recently New Zealand has consistently imported significant quantities of navy beans (*Phaseolus vulgaris* L.) primarily for use in tinned baked beans. However, the area sown to navy beans has been increasing rapidly and presently approximately 800 - 1000 ha are being grown each year.

While environmental conditions in Canterbury are somewhat marginal for navy beans the crop has consistently yielded well in experimental work at Lincoln College. With irrigation seed yields are usually near 3 t/ha from small plots (Love *et al.*, 1988).

In 1974, Goulden reported yields ranging from 1.4 to 3.3 t/ha in Canterbury.

However, the crop can be risky for growers with variable yields particularly in dryland conditions. The crop is of short duration, and has to be sown in late spring due to it's frost sensitivity.

The Canterbury growing season is characterized by hot dry North West winds, which cause high soil moisture deficits. The combination of low night temperatures and dry conditions can result in low yields in the absence of irrigation.

An additional problem with the crop in Canterbury is the delay in maturity which can occur in wet seasons or with late sowing. This can cause harvesting problems or seed quality problems due to fungal infection of pods.

While there are some problems for growers, the crop can be profitable and can provide growers with a valuable addition in their crop rotation.

HUSBANDRY

The crop should be sown in mid to late November on a fertile free draining site. The crop is usually sown in 15 cm rows 4 to 5 cm deep. A suitable plant population is about 60 plants/m^2.

Since the plants are not aggressive, weed competition should be minimized with trifluralin.

Navy beans are not efficient at fixing atmospheric nitrogen due to poor symbiosis and a low genetic ability (Graham, 1981). For this reason nitrogen is usually applied to the crop. Overseas recommendations usually suggest nitrogen application at sowing. In New Zealand however, temperatures in mid-November can drop below 11° C. At these low temperatures nitrogen application can result in severe plant damage (Andrews *et al.*, 1989). Because of this nitrogen application should be delayed until mid-December.

Finally, dryland navy bean crops are very risky. The crop can only be recommended for growers with irrigation.

IRRIGATION

The most important factor which affects seed yield is irrigation. At Lincoln College, with irrigation, seed yields have consistently been around 3 t/ha. Even in wet seasons, such as 1983/84, irrigation has given significant yield increases (Table 1).

Table 1: The effect of irrigation on navy bean seed yield at Lincoln College in 1983/84 and 1984/85 (Love *et al.*, 1988).

Irrigation	Seed Yield (g/m²) 1983/84	1984/85
Full	319	309
Nil	278	131
Significance	**	***
SE	3.2	10.9

, * significant at $P < 0.01$ and 0.001 respectively.

In most seasons, in Canterbury a very high potential soil moisture deficit builds up in February and March. Without irrigation this deficit will significantly reduce seed yields.

POPULATION

Like most other grain legumes, navy beans exhibit plastic responses to plant population. At high populations, there will be only a small number of pods/plant while at low populations there will be a much larger number. However, overall yield is much less sensitive to population and the effect may depend on other factors such as soil moisture content (Table 2).

While population may have only a small effect on seed yield, it can increase plant height and lift the pods farther from the ground (Love *et al.*, 1988). this can produce plants which are easier to harvest and less prone to fungal infection on the pods (Table 3).

SHELTER

In Canterbury strong North West winds have been shown to cause significant crop damage (Sturrock, 1969). In trials at Lincoln College, shelter has only provided small uneconomical increases in seed yield. The most significant yield increase with shelter was only 5.8 %.

Table 2: The effect of plant population on seed yield of navy beans in two seasons in Canterbury.

Population (Plants/m²)	1983/84 irrigated + unirrigated
44	292
94	305
Significance	*
SE	4.2

Population (Plants/m²)	1984/85 irrigated	unirrigated
30	291	135
50	313	134
70	325	125
SE	10.9	3.1

* significant at $P < 0.05$.

Table 3: The effect of plant population on the height of the lowest point of the pod above the ground (Love *et al.* 1988).

Population (plants/m²)	Height (cm)
30	3.7
50	5.1
70	7.4
Significance	**
SE	0.4

** significant at $P < 0.01$.

CONCLUSIONS

Navy beans can be grown successfully in Canterbury. However, the crop requires proper husbandry and is only suitable for specialist growers. Without irrigation the crop is unlikely to be viable and in wet seasons there may be significant problems with harvesting due to delayed maturity.

Although there are problems, at the present high prices for navy beans, the crop is attractive to growers.

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