

# PROSPECTS FOR RENEWED CEREAL GRAIN PRODUCTION IN THE NORTHERN NORTH ISLAND

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## ABSTRACT

Recent trials with wheat, oats, barley and triticale grown at Pukekohe have given promising results. The data suggest that cereals, particularly wheat, could be successfully grown on a commercial scale in the north of the North Island and that the considerable local requirements for these grains could be largely supplied from within the region. The infra structure for cereal production already exists to service the maize industry.

*Additional Key Words: wheat, oats, triticale, barley, crop potential, wheat quality*

## INTRODUCTION

Cereals were first grown in New Zealand in the Bay of Islands by Samuel Marsden who sowed wheat in 1813 (Claridge, 1972). The Maori community later started growing wheat and by the late 1850's an estimated 2,000 hectares were grown in the Waikato, mainly around Te Awamutu. Production ceased at the time of the land wars (McLaughlan, 1981). In the early colonial period, significant quantities of wheat were grown around Auckland to supply local millers. From the 1850's, wheat was the major crop of the Papatoetoe and Mangere areas for over half a century (Smytheman and Tonson, 1962). However, with the increase of cereal growing in the South Island, the area of cereal crops in northern areas declined as other farming enterprises e.g. dairying, proved to be more profitable or popular. An increasing prevalence of cereal diseases, particularly rusts, may also have played a part in the decline.

About 2,000 ha of oats was grown for chaffing in the 1930's but this also declined in later years. There was about 2,000 ha of barley grown during the 1960's (Claridge, 1972) but since then the area has dropped back to about 800 ha (M. Auld, pers. comm.) as maize production developed. Little recent research effort has gone into the production of small grain cereals in the northern half of the North Island. Previously available cultivars have not been well adapted and there has been no programme to select suitably adapted cultivars for the area.

Crop Research Division started work on the evaluation of cereals at Pukekohe in 1980/81 in response to enquiries from farmers who had started growing wheat in the region and were impressed by the possibilities that the crop offered.

This paper outlines the work carried out at Pukekohe since then and discusses the potential role cereals could play in agriculture in the northern North Island to satisfy the substantial market for cereal products, particularly wheat, in the area.

## MATERIALS AND METHODS

Replicated field trials of wheat, barley, oats and triticale have been grown at the DSIR Research Station, Pukekohe over four seasons. Plots were 5 m long and the rows 200 mm apart. In 1980/1 and 1981/2, 10 row plots were grown and in 1982/3 and 1983/4 six row plots were grown in 1.5 m wide beds. From 1982/3, the trials were covered with netting from early flowering to protect them against birds. In 1980/1, plots were cut by hand and sheaves carted to a shed for threshing in a stationary thresher. The next year, plots were cut by hand and threshed in the field with a 'Vogel' single plant thresher. From 1982/3, the plots were direct headed with a small plot 'Hege' harvester. Trials were sown in early October and harvested in early-mid February. The number of lines of cereals grown at Pukekohe from 1980/1 to 1983/4 are listed in Table 1.

**TABLE 1: Number of lines grown in different seasons at Pukekohe.**

	Wheat	Oats	Barley	Triticale
1980/81	6	—	6	—
1981/82	7	—	8	1
1982/83	2	6	—	2
1983/84	5	7	4	4

## RESULTS

### 1980/81

Grain yields expressed at uniform moisture content of 14 percent and MDD wheat baking scores are given in Table 2.

The barley yield was low with a mean for all lines of 2.29 t/ha. However, the wheat yield was satisfactory with a mean yield of 3.68 t/ha. Quality evaluation provided by the Wheat Research Institute showed that the MDD baking score of the Karamu was low but the other wheats were all good with Oroua and 6101/8 having a very high score of 26.

**TABLE 2: Performance of wheat and barley lines at Pukekohe 1980/81.**

Wheat	Grain yield t/ha	MDD baking score	Barley	Grain yield t/ha
Karamu	4.00	13	Mata	2.54
Oroua	3.59	26	Hassan	2.39
Rongotea	3.27	22	Zephyr	1.97
Pataka	4.21	21	HB878,02	2.90
6101/3	3.37	17	HB889,01	1.93
6101/8	3.64	26	HW2,02	1.98
L.S.D. (0.05)	NS			0.64
C.V.%	15.9			18.5

**1981/82**

The 1981/82 trial suffered badly from bird damage and it was impossible to determine yields. However, baking tests were done on the wheat and Karamu had a higher baking score than in 1980/81 (17); Oroua, Pataka and 6101/8 had scores of 20 while Rongotea had a poorer baking score of 15. The best baking score of 24 was recorded by Otane.

**1982/83**

Results of the oat, wheat and triticale lines are summarised in Table 3.

The Canadian Department of Agriculture oat lines had plump well filled grains and all yielded significantly above the Omihhi control which lodged badly. The baking quality of Oroua wheat was again very good.

**TABLE 3: Performance of oats, wheat and triticale lines at Pukekohe 1982/3.**

Oats	Grain yield t/ha	Lodging %
Omihhi	4.33	68
CDAI,01	5.39	2
CDAI,02	5.35	6
CDAI,04	5.62	3
CDA4,02	6.03	4
CDA6,01	5.82	2
LSD (0.05)	0.73	
CV%	11.0	
Wheat	Grain yield t/ha	Baking score
Oroua	4.85	23
Spring Purple	4.82	—
Bulk		
L.S.D. (0.05)	NS	
C.V.%	15.2	
Triticale	Grain yield t/ha	
Beagle	4.18	
Mapache	4.74	
L.S.D. (0.05)	NS	
C.V.%	9.3	

**TABLE 4: Performance of oats, wheat, barley and triticale lines at Pukekohe 1983/4.**

Oats	Grain yield t/ha	Lodging %
Omihhi	1.52	97 c*
Awapuni	3.49	64 b
CDA3,02	4.64	29 a
CDA5,01	4.69	48 ab
CDA7,02	2.86	34 ab
CDA8,01	4.62	24 a
CDA8,02	3.78	35 ab
L.S.D. (0.05)	1.05	
C.V.%	19.4	
Wheat	Grain yield t/ha	Baking score
Karamu	6.74	11
Oroua	6.82	25
221,01/11	7.19	11
Pur 82F6	5.83	25
Pur 82G6	5.76	17
L.S.D. (0.05)	0.52	
C.V.%	5.8	
Barley	Grain yield t/ha	
Mata	4.06	
HR59,01	4.16	
HR72,01	4.55	
HJ445,03	4.56	
L.S.D. (0.05)	NS	
C.V.%	7.7	
Triticale	Grain yield t/ha	
Beagle	5.17	
Karere	5.55	
Aranui	6.38	
Mapache	4.67	
L.S.D. (0.05)	1.14	
C.V.%	12.1	

\* Tukey LSD range (0.05) on angular transformed data  
**1983/84**

The performance of the oat, wheat, barley and triticale lines are summarised in Table 4.

Although none of the CDA oat lines was the same as those grown the previous year they again yielded well above the Omihhi control. Omihhi lodged badly again and was severely infected with crown rust to which all the CDA lines were resistant. Lodging was more severe than in the previous year. This can be partly explained by the considerably taller crop. The crop mean height was 126 cm against 106 cm in 1982/83. Overall oat yields in 1983/84 were well below those of the previous year.

The wheat yields were well above those recorded in the previous season. Oroua yielded about 2 t/ha more in 1983/84 than in 1982/83. The wet season meant that baking quality of some lines was below that of previous years but the quality of Oroua was still very good.

Barley yields were well above those recorded in earlier trials but they were still far below the yields recorded for the wheats.

Of the triticales, Mapache yielded the same as in the previous year. However, Beagle which had a significantly lower yield than Mapache in 1982/83, had a higher yield in this trial while Karere and Aranui yielded more than either of these.

## DISCUSSION

The results from these trials have been promising and the yields suggest that cereals could play a significant role in the agriculture of northern areas.

Barley is currently the most widely grown of all the small grain cereals in the northern North Island. However, with an area of 750 ha grown in the Bay of Plenty, Waikato, South Auckland and Northland, it occupies only 4.3 percent of the area in maize. Barley must compete with maize as a stock feed and, although it has some advantages, particularly in pig rations, these do not compensate for the yield disadvantage. Barley is generally grown as a catch crop.

At this stage, wheat appears to have more potential than barley in the north because yields are higher and the local market for wheat is larger. The wheat yields recorded in 1982/3 and 1983/4 compare very favourably with those usually obtained elsewhere in New Zealand.

The 1983/84 season at Pukekohe was unusually wet and, although the quality of some lines in the trial was poor, Oroua produced a satisfactory quality. Therefore, provided wheats of recognised high quality are grown, good bread wheat should be able to be produced. The identification of new wheat cultivars particularly suited to the region could improve the productivity and reliability of the crop.

Total wheat production in New Zealand over the last decade has been around 314,000 tonnes per year, while an average of 56,000 tonnes has been imported to make up the shortfall. Around one half of the New Zealand population lives in the northern half of the North Island so about 50 percent of New Zealand's wheat consumption is in this area. Most of the wheat used at present comes from the South Island with the balance coming from Australia.

Should market conditions encourage wheat growing in the Waikato and South Auckland region then the trials indicate that both yields and quality should be satisfactory.

There would need to be little capital investment to establish a significant wheat industry in the northern North Island. The present annual maize area in the region is 17,000 ha, and the industry was able to handle larger areas in the mid 1970's. The major period of wheat harvest is likely to be in the month of February. At this time the combine harvesters and driers are idle and the large silo capacity is mostly empty. There would then be a period of around two months after completion of the wheat harvest to remove wheat to the mills before silos would be required again for maize.

Triticale is a relatively new grain crop. Although it has yielded reasonably well, particularly in 1983/84, it is

unlikely to fulfil a significant role in northern areas in the foreseeable future unless it displaces barley or maize as a feed grain or some other use is found such as for human consumption or manufacturing.

The performance of the rust resistant oat lines in these trials has been very promising and oats are another crop which could become important in these northern areas. Oats, both as grain and chaff, are important for race horse feed. Of 6,500 thoroughbred horses currently racing in New Zealand, around 40 percent are based in the Auckland/Waikato area. There are 7,500 thoroughbred brood mares and a small but significant trotting industry is concentrated in the Auckland/Waikato area.

Because of their light weight to volume, oats are a relatively high cost product to transport. At present, the requirement for feed oats is satisfied by transport of grain from Canterbury and Southland. There is therefore a potential for several thousand hectares of oats to be grown in the region just to service the local horse industry.

New cultivars of wheat and oats with significant advantages in disease resistance, agronomic performance and quality characteristics over previously available cultivars will provide a valuable new germplasm base from which the productive cereal growing area in the north of the North Island could develop. Further agronomic research would be desirable to confirm the economic viability of cereals in the area.

Ministry of Works and Development statistics indicate that there is about 900,000 ha of potential arable land of class I, II and III in the northern half of the North Island. At present, dairying is by far the largest single land use in this area. Cereal cropping could integrate very well with dairying as a land use. Cereals offer the possibility for land to be cropped, then used for a winter feed crop, or returned to pasture. An increased supply of winter feed could then be available enabling calving in some of the dairy herds to be brought forward. This could improve the efficiency of the dairy industry by spreading the period of peak milk supply to the factories.

## CONCLUSION

Cereals, especially wheat, can be seen to have a significant potential role in northern areas of New Zealand by supplying the considerable requirements of the region. It appears that satisfactory standards of yield and quality can be met and the cereals would complement very well the existing maize and dairying industries in the area.

## REFERENCES

- Claridge, J.H. 1972. "Arable and Farm Crops of New Zealand", Reed Publishers and DSIR. 345 p.
- McLauchlan, G. 1981. "The Farming of New Zealand." Australia and New Zealand Book Co. Pty. 256 p.
- Smytheman, I.F., Tonson, A.E. 1962. Our First Hundred Years. An Historical Record of Papatoetoe. Papatoetoe Borough Council. 168 p.