Paper 6
MAKING BARLEY CROPS PRODUCTIVE

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INTRODUCTION

On the subject of making barley crops productive no hard and fast rules can be given, because variable seasonal conditions can provide surprises.

As Burns said,

"In proving foresight may be vain:
The best laid schemes o' mice an' men,
Gang aft a-gley,
An' lea'e us nought but grief an' pain,
For promis'd joy."

However, guidelines to achieving optimal results can be presented.

YIELD

The obvious way to make barley productive in terms of money, is to produce the highest possible yield of salable grain. I calculated a gross margin for barley, grown on Temuka silt loam on the lower plains area of Central Canterbury. In this case the crop was direct-drilled into dessicated white clover/greenfeed oats, and overhead irrigation was available, to give a yield of just over 5 tonnes/ha.

Using this gross margin analysis as a model, a table was constructed to show gross margins at various yield levels up to 8 tonnes/ha. The top yield is not a pipe-dream, because on a field scale an Ashburton farmer produced 7.7 tonnes/ha with Mata barley in the 1980 Ammo-Phos competition. In the table a yield level of 3.5 tonnes/ha is included because this is the average barley yield for New Zealand during the five seasons 1975-76 to 1979-80. Another figure included is 1.1 tonnes/ha which shows the break-even point to cover growing, heading, cartage to silo, and cartage to delivery point. The cost of growing the crop is taken as $171.10/ha, and heading and cartage is $18.80/tonne (Table 1).

The point obvious to everyone is that crops yielding below average show a low or non-profitable gross margin. Better-than-average crops not only improve the whole farm gross margin, but they put barley into a better position to compete with other farm activities. For instance, on the Temuka silt loam spring wheat could yield about 5.4 tonnes/ha. With the wheat at $195/tonne (gross margin $800/ha) barley needs to produce at least 6.2 tonnes/ha at $172/tonne to compete.

How can we achieve profitability from barley? An exact blueprint cannot be presented, but some long-standing practices are still sound. These are not necessarily too old-fashioned, and some good lessons can be learned from the chronological graph of barley yields in New Zealand, covering 1870-1980 (Paper 1).

TABLE 1: Barley gross margins at different grain yields.

Yield (t/ha)	Gross Return (@ $172/t)	Direct Costs	Gross Margin
1.1	193	192	0
2	344	209	135
3	516	228	288
3.5	601	237	365
4	688	246	442
5	860	265	595
6	1032	284	748
7	1204	303	901
8	1376	322	1054

FACTORS TO CONSIDER

Place in rotation

As an adaptable crop, barley is found in a variety of positions in the cropping pattern of mixed farming. Four times out of five barley follows a crop rather than pasture, which makes seed-bed cultivation a cheaper operation. On the other hand, barley can exploit fertility after pasture with reasonable clover content that has carried good stock numbers, which reduces the need for fertilisers. This applies especially to nitrogen; added nitrogen will not give a yield response, and may even give a yield reduction with a crop of thin grain, under these circumstances.

Other restorative crops leading to higher barley yields are swedes, turnips, rape, kale, greenfeed, crop aftermath

heavily grazed, and the legumes (lucerne, peas, beans, lupins and seed clover stands) when all plant residues are retained. Depletive crops before barley are wheat, barley, oats for grain or chaff, linseed, potatoes not heavily fertilised, annual ryegrass seed crops, processing peas with vines removed, and also fodder beet and kale when removed and fed elsewhere. Poor grass pasture which carried low stock numbers is of little help in restoring fertility.

Choice of Cultivar

There are now (1982) 19 barley cultivars eligible for seed certification by the Ministry of Agriculture and Fisheries. Two of these are provisionally recommended for winter sowing, for which there are (1982) no official trial yield data, and one cultivar, Rupe, is now outclassed in performance. (Six further cultivars have been listed since this paper was prepared -Ed.). This leaves 17 cultivars, which are described and ranked for yield, according to district, in Aglink FPP 162, "Barley Cultivars, Recommended List of 1981". This publication is a must for every barley grower who wishes to pick a good performer in a large field of contenders (1983 List: Paper 12). Four (Carlsberg, Kakapo, Pirouette and Universe) do not give consistent adequate yields in Canterbury or North Otago.

My recommendations for Canterbury and North Otago for spring sowing are considerably influenced by the relative yields obtained in recent trials (Table 2). However, when making your selection do not consider relative yield alone, because other characteristics determine the best usage of a cultivar, according to farm circumstances. Yields are expressed as percentages of the mean yield of standard cultivars, which were equal in yield. Differences of three points or less may not be significant.

TABLE 2: Relative performance of barley cultivars in Canterbury-North Otago.

Gwylan	107	Kaniere	102
Goldmarker	106	Makareta	102
Magnum	106	Manapou	102 (m)
Ark Royal	104	Hassan	100
Georgie	104	Mata	100 (m)

(m) cultivars suitable for malting.

Starting from the top of the ranking list, not all farmers should select Gwylan, because it produces thin grain and very high screenings under moisture stress. Its high yield (shown only in this region of New Zealand) is expressed with adequate irrigation or on good soils which provide sufficient moisture.

Goldmarker is another top ranker, but it has inherently smallish grain which may give high screenings unless well grown. The straw can lodge a little, whereas Gwylan has very short strong straw. The other top yielder is Magnum, which normally produces plump grain with low screenings. Its late maturing habit may be a disadvantage in some circumstances.

Ark Royal can be a high yielder but is not recommended for light land. It is also a later-maturing cultivar and often produces high screenings unless irrigated. Georgie, Kaniere and Makareta are consistently good yielders of plump grain, with no really serious defects.

Manapou has a place in this region because it maintains a good yield in dry seasons, when other cultivars have a greater yield depression without water. Hassan and Mata are both well-tried consistently good barleys for yield, plump grain, maturity and most other important characteristics. Julia gives inconsistent yields, mainly because of loss of heads in windy conditions. Our main trusty friend since 1965, Zephyr is gradually being replaced by the newer cultivars, although it still occupied 54% of the New Zealand barley area in the 1979-80 season.

Because the next season is an uncertain event, my selections for consideration on the tote would be from Georgie, Kaniere, Hassan and Mata for all-round general performances, Manapou for a dry event, and Gwylan, Goldmarker, Magnum and Ark Royal with extra special treatment to give their top performance.

Sowing time

This may extend from late August, on warm free-draining soils near the coast, to early November on poorly-drained soils or in higher altitude inland districts with colder soil in the spring. A late catch crop may even be sown in December. The general rule is to drill when soil temperatures are high enough to initiate the spring flush of pasture growth, and a suitable seedbed has been prepared.

Within these limits, the earlier the sowing the better the result in getting barley established and though the vital growth and development stages before summer moisture shortage begins. However, the more wide-spread availability of irrigation allows for successful later sowing if required. This will allow the barley area to be utilised longer for early spring feed, spread the spring workload, buffer the crop against summer moisture deficiency, and utilise irrigation water and facilities after other crop water needs have been satisfied.

To illustrate the adverse effect of late sowing, most of us will remember the 1974-75 season, when sowing was delayed at least five to six weeks and seedbeds even then were less than ideal. In 1974 the July rainfall was 66mm, August 98mm, September 77mm, and October 66mm at Lincoln. Except in very free-draining soils there was no chance of preparing a seedbed or sowing spring crops. Soil dried out during a very dry November, December was dry, none of the late-sown barley tillered well, damage from leaf diseases was severe, and the critical grain-filling stage received no rain until mid-January, which was too late for most crops. The result was one of the most disappointing barley crops in memory, with the first-sown crops having low yields and high screenings, and finally the later crops sprouted in the head during the very humid weather that arrived in February.

The result was an average yield of 2.5 tonnes/ha, which explains the dip in the graph of yields (Fig. 1 Paper 1). Comparable yields for adjacent seasons were 3.5 tonnes

in 1972-73, 2.8 tonnes in 1973-74 (a dry season), and 3.4 tonnes in 1975-76.

A recommendation — if possible do not unduly delay sowing unless the crop can be irrigated as necessary. However both extra irrigation and later sowing, requiring a higher seeding rate, cost extra money.

Sowing rates

Rates vary between 80-170 kg/ha depending on time of sowing and soil type. Early-sown crops have more time during early growth and development to produce more tillers per plant, therefore a low seeding-rate is employed. Similarly a low rate is employed on very light land which cannot support a very dense crop, especially through the grain-developing and filling stages. On the other hand, late sowings in November, or even December, hurry through their early development stages and produce only one or two tillers per plant. The extra plants at the higher rate compensate for this to produce enough ears per unit area. (Millner, Paper 4).

Fertilisers

Barley does best on soils that do not have too low a pH.

Extensive fertiliser trials many years ago showed that 120 kg/ha of superphosphate or equivalent gave a payable yield increase. Soils with a high yield potential for barley may show economic yield responses with up to 250 kg/ha of superphosphate. No reliable evidence is available to show any advantage in applying potassic fertiliser as an extra. Contrary to English experience, nitrogenous fertilisers do not give regular yield increases in New Zealand, because of the unreliable spring and early summer rainfall. Also the nitrogen status of the soil is usually adequate for barley when it is sown after pasture (with clover) or other good restorative crops, (Drewitt, Paper 15).

Weed control

Spraying for weed control is now standard practice, to reduce the competition of weeds for moisture and light. Reductions of 25% in grain yield have been recorded with only a moderate infestation of fathen allowed to develop in a dry season.

Disease control

Profitable yield can be lost with disease loads, (Gaunt, Paper 7; Close, Paper 8).

Harvesting

Barley is an easy crop to thresh if grain and straw are in fit condition. The grain should be undamaged, rubbed entirely from the head, and with the awns rubbed off. To avoid grain damage always opt for the slowest drum speed that will do the job. Set the concave close enough to the drum to achieve a slow firm rubbing action, similar to threshing a head with the heel of one hand in the palm of the other as we sometimes do to assess fitness of a crop. In marginally fit crops I have set headers with the slowest possible drum-speed (pea speed) and the drum-concave clearance as close as possible (clover clearance), to achieve clean threshing with no grain damage.

Storage

Correctly harvested grain at correct moisture is storable and marketable at the most advantageous price. Damaged or moist grain encourages the development of moulds and any residual storage pests. Rubbishy grain, or grain with a lot of awn still adhering, is difficult to handle through conveying systems and takes up costly extra space in storage.

SUMMARY

I would advise you to manipulate these guidelines to your advantage and get into the top sector of the gross margins.

DISCUSSION

Q; Where does Triumph come on the scale?.

Malcolm; On the first two years' results it looks promising. My prediction is that it will not be at the top, but will be near the top and throw a reasonably plump grain. But one of the rules for this guide-line or recommended list for barley cultivars, is that they must have at least three seasons' trials, and at least ten trials in any one region. Triumph has had two full seasons now and we've started to learn a bit about its performance in New Zealand. Next year we'll know more. These recommended lists are a must for all serious barley growers.

Scott; What is the most reliable source of information on cultivar choice?

Malcolm; Listen to your grain agent, but in some cases with a grain of salt. Most of them have a good product to sell, but I think the crucial test is enough trials over a minimum of three seasons.

Q; Should we be sowing the modern cultivars earlier?

Malcolm; You can sow from the end of August in light free-draining soils near the coast. Nearer the hills spring doesn't start till the first week in November. You can still get caught out. One year, barley sown at the end of August-September, terrific; another year barley sown at the beginning of October can strike 100-120mm of rain, for three or four days on slightly heavy soil, and be a disaster.