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Can rapeseed make a comeback?

By N. N. Roy,
Plant Breeder

Rapeseed was introduced as an alternative crop for southern agricultural areas in 1969 during a slump in the world wheat market. Farmers accepted it so rapidly that by the 1972/73 cropping year more than 40,000 hectares of rapeseed were being grown. Then the disease blackleg (Leptosphaeria maculans) devastated the crop. Rapeseed cultivation virtually stopped.

The Department of Agriculture started a 'crash' rapeseed breeding programme in 1973. Aided by funds from the Oil Seed Research Committee, Western Australian research workers succeeded in breeding varieties of the commercial rapeseed species Brassica napus, incorporating resistance to blackleg as well as improved oil and meal quality characteristics such as low erucic acid and low glucosinolate content.

The world's first blackleg resistant, low erucic acid rapeseed variety Wesreo was released in 1978. It was followed by Wesway (1979), Wesbell (1980) and Wesroona (1980). The last of these was recognised as the world's first rapeseed variety in which blackleg resistance was combined with low erucic acid level, low glucosinolate level, early maturity and good yield. All these varieties are now grown in other States of Australia and are in demand overseas as a source of blackleg resistance.

No revival

Contrary to the expectations of some researchers and producers, the rapeseed industry in Western Australia has not revived in spite of the early release of these varieties. The following factors have discouraged the full-scale cultivation of rapeseed in Western Australia.

1. The abolition of wheat quotas and the revival of markets for wheat, barley and oats. New high yielding varieties of these crops are now available, suitable for the south west high rainfall areas where rapeseed was grown previously.

2. New lupin varieties have been introduced as alternative legume crops.

3. Farmers consider rapeseed more risky to grow than the cereal crops and lupins. Some of the reasons for this are:
   - It is difficult to control weeds in the crop.
   - The development of rapeseed varieties with rapid seedling growth and herbicide resistance may reduce this problem.
   - Pod-shattering causes losses at harvesting.

The development of resistance to shattering would overcome this problem. Until varieties incorporating such resistance are available, wind-rowing techniques, now under test, may reduce shattering.
Rapeseed’s susceptibility to waterlogging.

Like many other crops, rapeseed reacts badly to waterlogging. The only solution to this is to avoid areas with a history of waterlogging. In general, land which supports wheat crops will be suitable also for growing rape.

It is badly affected by sandblasting.

Minimum tillage techniques are being investigated as a means of resolving this problem.

Rapeseed has proved valuable as a cleaning crop for following cereals. As in New South Wales and South Australia, rapeseed should find a place in Western Australia in rotations with existing pastures, and grain legume and cereal crops. Research workers would like to see farmers try rapeseed again even if on a small scale, to develop expertise in handling new varieties and new agronomic methods. Model demonstration plots grown under farm conditions by experienced Department of Agriculture district staff may help to show the potential of rapeseed under good management.

Future research

To improve the present image of rapeseed as a crop, further research on the following aspects is under way:

• Increased blackleg resistance

New races of blackleg with greater virulence are likely to break down the resistance of today’s rapeseed varieties in the future. Varieties with alternative sources of resistance will be needed to replace the existing ones. For the first time researchers have succeeded in transferring the high-resistance mechanisms from the species of Brassica juncea into commercial rapeseed through an interspecific cross. This opens up new possibilities for developing highly resistant rapeseed.

• Improvement of yield

At some Departmental research stations it has been possible to obtain yields of about 2 tonnes per hectare of rapeseed over areas of 3 to 5 hectares. Using recommended varieties, good free-draining land, clean cultivation, adequate fertilisers, timely sowing and good after-care should help to lift yields substantially higher than the present overall yield on farms in high rainfall areas.

Further plant breeding is required also to increase yields, although it is a slow process. At present, step-by-step yield improvement through crossing high yielding blackleg resistant lines and lines with shattering resistance is underway.

To sustain the high yield advantage in a variety, it will be essential to incorporate shattering resistance into it to avoid the need for wind-rowing.

• Shattering resistance

The rapeseed species B. napus is more prone to shattering than turnip rape (B. campestris) or Indian mustard (B. juncea). For the first time, shattering resistant plants have been observed in some rapeseed selections from interspecific crosses. A laboratory technique has been developed to screen for shattering resistance.

The other alternative is to develop B. campestris and B. juncea varieties with inherent shattering resistance.

• Herbicide resistance

Promising crosses have been made in an effort to develop herbicide (Simezine) resistance in rapeseed. If these succeed it will be possible to control such weeds as wild radish and wild turnip in rapeseed crops.

• Lodging resistance

Short varieties with a strong root-base and well-balanced plant structure, including balanced growth, are required to overcome lodging problems.

What makes a good rapeseed?

For its seed to compete successfully on world markets, a rapeseed variety needs:

• A low erucic acid content. Erucic acid is a fatty acid which has been claimed to predispose some people to heart disease.

• A low linolenic acid content. Linolenic acid would be one of the more desirable polyunsaturated fatty acids but for its tendency to turn rancid easily.

• A high linoleic acid content of 30 to 40 per cent. Linoleic acid is a desirable, doubly-unsaturated fatty acid, which has no effect on blood cholesterol levels.

• A low glucosinolate content. Glucosinolates are toxic compounds containing sulphur. Rapeseed meal is rich in protein; glucosinolates would reduce its value as stockfeed.

Improving the products

New disease resistant varieties now being developed have increased oil and protein percentages as well as high yields. They also have very low erucic acid levels and low levels of glucosinolates.

New lines with both high linoleic and low linoleic acid levels are being developed. Their high level of polyunsaturated fats will make the oil more suitable for table margarine, mayonnaise and salad oil. Seed of such varieties also will be able to compete strongly in world markets.

Developing turnip rape (B. campestris)

As a species, B. campestris is the most suitable for the development of shattering-resistant varieties. Some lines have been developed to combine high blackleg resistance, low erucic acid level and shattering resistance. Some of the B. campestris varieties will be suitable for growing in medium to low rainfall areas.

Developing Indian mustard (B. juncea)

B. juncea is an ideal species for the production of varieties with high blackleg resistance, and incorporating shattering resistance and drought resistance.

Using ‘zero erucic’ lines (OeaBJ) developed from the W.A. programme, and using the CSIRO selections Zem-1 and Zem-2, will speed up progress in the release of high-yielding, low erucic acid mustard varieties for both dry and wetter areas.