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Triticale—a new grain crop?

The advent of the cereal ‘triticale’ (pronounced tri-ti-cahlee) to Western Australia has been greeted enthusiastically by farmers and the Press. They anticipate spectacular yields of a coarse grain which could find a place in ethanol production as well as in stock feeding.

It is not that easy. Like so many other imported plants of all kinds, the original triticale introductions did not adapt well to this State. But the responsibility for developing the potential of this new crop is now in the capable hands of Western Australia’s plant breeders. As a result, the future for triticale now looks considerably brighter.

Senior Plant Breeder J. T. Reeves, of the Department’s Plant Production Division sums up the situation of this cereal prospect:

**Origin**

Triticale was derived from crossbreeding wheat (Triticum) and cereal rye (Secale), getting part of its name from each parent. It is the first successful “man-made” cereal grain.

The first wheat-rye crosses were reported in the scientific literature just over a hundred years ago. Some of these were man-made and some had been created by natural cross-pollination. Most were sterile due to genetic incompatibility between the parent species. Even when fertile seeds were produced, the resulting plants showed a high degree of sterility and what grains were produced were extremely shrivelled.

The discovery of the chemical colchicine in 1937 helped plant breeders overcome sterility in such hybrids. This chemical induced plants to double their chromosome numbers. Doubling allowed pairing to take place between the rye chromosomes and also between the wheat chromosomes, without either set interfering too much with the other. This removed some of the genetic incompatibility, but not all. It opened the way for further improvement.

By 1969 ‘hexaploid’ varieties had been released in a number of overseas countries, including Canada, Spain and Hungary. These had the same chromosome number as “common” or bread wheat and had originated from crosses between 28-chromosome durum wheat and spring rye. The triticales had obtained 28 chromosomes from the wheat parent and 14 from the rye. Crosses between bread wheat (42 chromosomes) and rye produced octoploids, which were invariably inferior to the hexaploids.

**Triticales in Australia**

The early European and Canadian introductions were not adapted to Australian conditions but improved material was obtained later from the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico. More recently several Australian States have started their own breeding programmes in an attempt to produce triticales better adapted to local conditions.

An outcome of this work has been the release in Australia of a number of new triticale varieties. The first was Grow Quick (or Gro-Qk), released and promoted by the late R. J. Doolin in N.S.W. This was followed by Satu from the University of New England, N.S.W., Tyalla from the Victorian Department of Agriculture and Coorong from the Waite Agriculture Research Institute, S.A. The last three have shown particular promise in their States of release, where their grain yields have been equal to or better than those from commercial wheat varieties.

**Triticales in Western Australia**

In 1969 the Department of Agriculture introduced 150 lines of triticale, 144 from the Department of Agriculture, Victoria and six from CIMMYT. They were sown first at the Mt Barker Research Station to determine their potential under high rainfall conditions. The material proved disappointing. Most of the lines were extremely tall, and grain yields were lower than those from wheat and barley.

Later introductions have been mostly from the International triticale nurseries. These have been tested more extensively at a number of different sites throughout the cereal growing
areas. They have proved superior agronomically to the older types, and grain yields have improved relative to yields from the other cereals.

Despite its name, the cultivar Grow Quick proved to be rather late in maturity and probably because of this produced low grain yields. It was not tested in the higher rainfall areas of the south coast, though it may yield better there because of its lateness. This cultivar has been grown commercially in Western Australia since 1978.

Other cultivars were only released commercially in other States in 1980, so there has not been enough time to test their suitability to local conditions. However those tested so far have generally been inferior in grain yields to wheat and barley. In only a few instances have yields been equal to those of the other cereals. They have shown their best results in the wetter cereal areas, particularly in the south.

It is not yet clear why triticale yields have been so poor here compared with other States. Our shorter growing seasons and different soil types are possible explanations. Triticales are reported to do well on acid soils, but this should be an advantage as many of our soils are acidic. Diseases also may have an effect. The better yields achieved in some trials possibly have resulted from resistance to Septoria, which is generally better in triticale than wheat.

Usage
Triticale cultivars are sometimes used overseas for green grazing. They probably will not be of much value for this purpose in Western Australia due to the shortness of our growing season. Therefore their chief value will be for grain production.

In the early phase any production will be for the local market as poultry, pig, sheep or cattle feed depending on suitability and relative price compared with other feedstuffs. Later, if production outstrips local demand, then overseas markets will have to be found.

The original introductions produced large, partly shrivelled grains, high in protein content. As yields improved and the material became more wheat-like in appearance the protein content started falling. It is now about the same as, or only a little higher than that of wheat. As bigger areas are sown to this crop, more data will be obtained on the value of the grain for various end uses.

Cultivation
Because the original introductions were large-grained they had to be sown at a higher seeding rate than for wheat to obtain satisfactory plant establishment. The newer strains are more similar to wheat in both grain size and general plant appearance. They would therefore have similar requirements to it in cultivation, fertilisers and the like.

Co-operation between research organisations
The Department of Agriculture and the Agronomy Department, University of Western Australia, have pooled resources for the introduction and preliminary yield testing of triticales, both from other States and from overseas. All introductions are grown first in rows at the Wongan Hills Research Station for observation. The most promising lines are harvested to provide bulk seed for yield testing at three sites in the cereal growing areas. As seed is multiplied, more extensive testing is carried out. The most promising lines emerging from these tests are included in a large number of variety trials planted each year throughout the agricultural areas of the State.

In addition a series of interstate trials were started in 1980. Three or four of the most-promising entries from each of the cereal growing States (except Tasmania) were sown at one site in each State. The local site was the Wongan Hills Research Station. Research workers expect that grain from the trials will be analysed for nutritive value. Also, promising material from these trials will be more extensively tested in subsequent years.