

Triticale in Arizona

*By Robert E. Dennis and Frank J. Zillinsky**

Triticale is produced by crossing wheat (*TRITICUM*) and rye (*SECALE*). Although the original successful crosses date back nearly 100 years, most breeding work is quite recent, having started within the past 20 years.

Breeding Procedures

Breeding techniques differ but usually Durum wheat is crossed with rye. The embryo is excised and cultured on nutrient media to produce the hybrid seedling. The seedlings are treated with colchicine to double the chromosome number, thus producing an amphiploid triticale having the complete chromosome complements of Durum wheat and rye $2n = 42$. Many breeders cross the hexaploid triticales thus produced with bread wheats and backcross the hybrids again to triticales to maintain the rye chromosomes. Breeders use many variations of these procedures but all begin with the wheat x rye cross.

Triticale Problems

Triticale plants of today's cultivars are usually of the spring type. They are vigorous with large broad leaves and massive root systems. The large spikes, however, are often misleading cause of extensive sterility (empty

florets). Shrivelled endosperms result in low bushel weights, averaging about 10 lbs. below those of adapted wheats. The percent crude protein in triticale seed is usually higher than that of wheat, some of which is associated with shrivelled endosperms.

The original triticale cultivars were all sensitive to day-length, usually growing taller and maturing later than wheat. Lodging of plants, breakage of heads and shattering of seed at or before harvest are other undesirable characteristics that may cause grain yield losses.

CIMMYT Has Program

Although problems exist, there is a bright future for triticale. Since 1964 the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) has been engaged in a cooperative triticale program with the University of Manitoba. Norman C. Borlaug and Frank J. Zillinsky lead this effort with much of the plot work being done at Ciudad Obregon and Navajoa, Sonora, Mexico. Many other breeders, both public and private, are giving attention to developing improved triticales.

**Agronomist, Cooperative Extension Service, University of Arizona, Tucson; and Triticale Project Leader, CIMMYT, Mexico.*

An intensive and ingenious breeding program at CIMMYT similar to that used to develop the high-yielding Mexican spring wheats, is being directed toward giving the world triticales that have potentials far beyond those now available.

Triticale breeders have developed lines with higher fertility, less sensitivity to day length, stronger straw and higher test weight of grain.

Nutrition Studies Show Promise

Improvement of triticale's nutritional value is another major objective of research programs. At present triticale is marketed primarily for livestock feed. Research by Fred C. Elliott at Michigan State University using meadow voles (small mice) has shown that some new triticale lines are equal to milk casein in nutritive value. Limited work in Mexico with laying hens has supported Elliott's research. Future triticale cultivars may be developed for use as human food.

Future for Triticale Bright

Much progress has been made in a relatively short time with triticale. Present commercial cultivars generally do not produce as much grain as the

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Landscape Architecture

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technique can be applied to determine a scaled order of aesthetic responses to various situations such as differentially treated wildland areas and all sorts of landscaped areas such as parks, golf courses and other recreational areas, streets, public buildings and private homes.

Whether an observer likes or dislikes a given situation, finds it satisfying or unsatisfying, beautiful or ugly is often a difficult discrimination to make. Color slides are used as the stimulus complex in this new technique. The signal a respondent is asked to notice is a feeling of liking of, or pleasure in, the content of the projected slide. Dislike, or a lack of aesthetic response, would be a non-signal. The respondent must also evaluate his degree of confidence in his response on a scale of 9 to 0. The program can be administered economically to diverse groups of respondents thus affording the opportunity of obtaining a broad sampling of preference.

It is envisioned that data generated by this and yet to be developed methods will provide a real body of theory and knowledge upon which to base the design process, thus removing it from its total dependence upon the intuitive process. Naturally we do not wish to minimize design quality that achieves the status of a true art form. Unfortunately, designers who can produce such works are rare. Since we now face an almost totally man-made environment from which there is virtually no escape, the way in which design decisions are made will significantly affect every level of our society. Any means of increasing output and productivity as well as quality of design is to be commended.

Research of the Landscape Architect at the University of Arizona is aimed to provide ways and means of enhancing those aspects of the physical environment concerned with beauty, aesthetics and other intangible qualities. Our lives would be much poorer, indeed, if we were forced to do without them.



University of Arizona delegation confer with world renown, Dr. Norman Borlaug, noted Nobel Peace Prize Winner. From left Bwarama Wudiri, a graduate student in Agronomy at the U of A and from Nigeria; Dr. Borlaug who is in charge of the experiment station at Ciudad Obregon, Sonora, Mexico; Ernesto Zamudio a U of A student from Elfrida, Arizona; and Robert E. Dennis, Jr., also a U of A student. The group visited Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT). The visit was to confer with the research and extension workers concerning new developments with triticale, wheat and other agronomic crops with special emphasis, or attention, to the application of these developments for use in Arizona.

Triticale

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better spring wheats in Arizona. However, some Arizona growers have obtained excellent forage yields with triticale.

The future for triticale seems bright but cultivar development will take time. Ultimately cultivars having fertility similar to wheat, plump seed, stiff straw and excellent nutritive value will be developed and released. This new plant type has the potential of becoming an important part of Arizona's small grain arsenal.

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Harold E. Myers Dean

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