



Trait Development for Triticale Variety's

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Introduction:

Triticale has the genomic constitution AABBRR or AABBDDRR and is an artificial cereal crop created from crosses between wheat *Triticum* sp. and Rye (*Secale cereale* L.). Triticale can be either hexaploid, octoploid or tetraploid, however, most triticale cultivars are hexaploids.

In the past, triticale has been used as a forage and feed grain as well as alcohol production for human consumption. Today it is primarily grown as animal feed being either a feed grain or forage crop. Breeders are attempting to improve grain quality to expand this market for human consumption.

Furthermore, Triticale has great potential for ethanol production since it yields higher volumes than corn.

Triticales are agronomically attractive due to their broad spectrum disease resistance. Yield potentials are significantly higher, however, test weights tend to be slightly lower than of wheats.

Progress thus far:

Significant improvements have been achieved in terms of plant height and earliness. Efforts continue on these traits as well as developing triticales with added quality, yield potential and threshing ability. Existing genetic variability's among stocks for these traits suggest that genetic gains for agronomic components that are associated with grain yield, test weight, plant morphology and phenology, and agronomic traits such as threshing ability is possible.

Progress may occur in small incremental steps in traits, like grain quality and duration, and thus warrant special attention in future breeding efforts.

The majority of triticale cultivars have copious awns, however, a limited number of types exhibit the awnless nature. This trait will potentially increase the market for it's use as livestock forage (Figure 1).



Figure 1. Awnless type Triticale.

Challenges:

We are currently working to:

1. Reduce plant height using dwarfing genes
2. Improve test weight through seed selection
3. Maintain winterhardiness
4. Increase earliness while maintaining stature
5. To fix a wheat type rachis in triticale lines
6. To fix the awnless head type
7. Improve Quality

Benefits & Rewards:

It is our sincere hope that our efforts in triticale will benefit the growers.

In the past, threshing ability of triticale has been poor due to the brittleness of it's rachis. At this point we have identified lines that carry the "wheat type" rachis. This will lead to increased threshing ability similar to that of wheat and reduce the incidence of volunteer plants in the field (see Figure 1-4).



Figure 2. The "wheat type" rachis in durum wheat, bread wheat and triticale, from left to right.



Figure 3. The "wheat type" rachis in triticale. Glumes may persist or come free from the rachis.



Figure 4. The "wheat type" rachis alongside the typical brittle triticale rachis.

Historically triticale has been rather tall and possessed weak straw. Ongoing progress is being made in both these areas. Figure 5 shows some advanced lines which are much shorter stature than what is typical of triticales. Typically however, Rht_3 triticale lines tend to be later as well as shorter (Figure 6). We are beginning work with lines carrying the Rht_{21} dwarfing gene and hope not to observe this correlation.



Figure 5. Short stature triticale lines.



Figure 6. Showing the possible correlation between short stature and lateness in Rht_3 triticale lines.