

## Sweet Corn Genotypes – How Do They Differ?

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### History

Corn's history can be traced to about 5000 BC and it's been cultivated for 4,000 years. The development of sweet corn has been much more recent. Before the **sugary gene (su)**, people ate field (dent) corn pulled at an immature stage. Sweet corn was documented in the 1770's in Pennsylvania, but had probably been cultivated by American Indians prior to that time. Sweet corn was first listed in a seed catalog in the 1820's. White sweet corn dominated the scene until 1902 when a yellow variety, Golden Bantam, was developed. Bi-colors were the logical next step when crosses were made between the other two colors.

Although color is the central theme to many sweet corn debates, color does not have a significant role in the flavor or the quality of the variety. Color is driven by regional preferences and marketing strategies. Because consumers buy with their eyes, it is an important consideration, but it won't be part of this discussion on eating quality.

The University of Illinois did much of the early development of the **shrunkened (sh2)** gene in the 1950's. The sh2 gene greatly boosted the sugar levels of the endosperm. The gene defect also slowed the conversion of simple sugars to starch.

In the 1960's, also at the University of Illinois, a corn was bred that was sweet and creamy and had a tender pericarp. This type of corn became known as **sugary enhanced (se)**.

### Variations of Eating Quality Within the Three Main Genotypes

There are some standard sugary varieties that taste better than other varieties. This is also true for sugary enhanced and supersweet varieties. In the case of the sugary enhanced varieties, it is fairly easy to understand that some varieties receive the se gene from both parents while other varieties only receive the gene from one parent. The varieties that receive the gene from both parents are called homozygous for the trait (double se), while the varieties that only receive the gene from one parent are called heterozygous (single se). A homozygous se variety has 100% se kernels, while a heterozygous se variety only has 25% enhanced kernels. Since the se trait boosts the quality, it's easy to see why a homozygous variety, typically, has better eating qualities than a similar heterozygous variety. But how does this explain why some su or sh2 varieties taste better than other varieties in a similar class? Also, some varieties within the same se class taste better than similar varieties. This is because there are other genes, described as modifier genes, which can also affect the eating quality. These modifier genes can come from one parent (heterozygous) or both parents (homozygous). Like the se gene, a variety that is homozygous for a modifier gene will have the trait in all of its kernels. Likewise, a

variety that is heterozygous for the modifier gene will have a lower occurrence of the trait in its kernels. So it is possible to have a 75 day, bi-color, homozygous se variety that eats much better than a similarly classed variety. This makes it possible to breed for flavor differences within a major genetic class.

### New Genotypes in the Marketplace

Sugary (su) varieties have good corn flavor, but lose their sweetness rapidly after maturity. The supersweet gene gives us higher levels of sugar and a slow conversion to starch, but it often contributes a tough pericarp. Supersweets can also lack creaminess and a complex corn flavor. Sugary enhanced varieties have a tender pericarp, a creamy texture and good corn flavor, but the sugars still convert to starch faster than in supersweet sweet varieties. What we really want are the best characteristics of each of the three main genotypes.

In the past few years, breeders have been “stacking” these genes. Now varieties may contain a number of different combinations of the three major genes and their modifier genes. Many of these new types have a much superior flavor than their old counterparts.

These new types can be broken down into two “pollination groups.” They generally behave as either a supersweet or sugary variety.

<b><i>SU GROUP (SU AND SE TYPES)</i></b>	<b>I S O L A T E</b>	<b><i>SH2 GROUP (SUPERSWEET TYPES)</i></b>
Normal (su)		Shrunken (sh2)
Sugar Enhanced (se)		<b>Augmented</b>
<b>Synergistic:</b>		Gourmet Sweet Brand™
Sweet Breeds™		Multisweet™
TripleSweet™		Xtra-Tender Brand™
Table Sweet™		Mirai™

These different backgrounds bring unique benefits to the grower. Because of the modifier genes, the quality can vary between varieties within classes. Here’s a brief look at each individual type.

#### Synergistic (2 types):

<b><i>Description:</i></b>	<b><i>Example</i></b>	<b><i>Kernel Types and benefits:</i></b>
Synergistic on a heterozygous se background	<b>Sweet Breed™</b> varieties such as Sweet Chorus, Sweet Rhythm	Roughly 25% se kernels, 25% sh2 kernels, 50% normal kernels. Typically has good seed quality. Su vigor, but should have higher sugars than a su.
Synergistic on a homozygous se background.	Bojangles, Charmed, <b>TripleSweet™</b> varieties such as Providence (BC4806)	100% se kernels, 25% kernels also have a supersweet trait. Sweeter than typical homozygous se varieties. Very good flavor. Characteristic homozygous se vigor.

#### Table Sweet™ :

<b><i>Description:</i></b>	<b><i>Example</i></b>	<b><i>Kernel Types and benefits:</i></b>
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Tablesweets™ are a high quality homozygous se.	<b>Table Sweet™</b> varieties such as Parfait.	The early se hybrids were all crosses between a very sweet line and a less sweet se line. The Tablesweets™ have both parents in the very sweet category. This results in a hybrid with much better holding ability and higher sugar levels.
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### **Augmented Shrunken:**

<b><u>Description:</u></b>	<b><u>Example</u></b>	<b><u>Kernel Types and benefits:</u></b>
Supersweet types that also carry the se trait	<b>Gourmet Sweet Brand™</b> <b>Multisweet™</b> <b>Xtra-Tender Brand™</b> 278A, 282A, Obsession	Supersweet background with se and modifier genes also in kernels. High sugars like supersweets, slow conversion to starch. Tender like a se.

### **Mirai:**

<b><u>Description:</u></b>	<b><u>Example</u></b>	<b><u>Kernel Types and benefits:</u></b>
Supersweet types that also carry the se and su traits	Mirai 002	Supersweet background with se, su and modifier genes also in kernels. High sugars like supersweets, slow conversion to starch. Tender like a se. Excellent “mouth feel.” Currently only available as a yellow.

### **Choosing Varieties for Your Farm**

Each year there are actually many thousands of new hybrid crosses made. Breeders have the daunting task of sorting through large blocks of these varieties. The breeders pare down these crosses to a few thousand of the most likely to succeed. These crosses advance to trials where they are again evaluated by the breeders and often product managers, salesmen and dealers. Typically, a few dozen will filter down to pre-commercial trials. Often, these trials are grown on local farms in strips or blocks. For several years a variety may be evaluated for disease tolerance, vigor, flavor and performance. Eventually, a few get named and sold. Perhaps some will become viable commercial varieties. A grower wouldn't be expected to be able to sort through so many varieties. Some farms will find it is more desirable to pick out “performance varieties” with adequate flavor, while other farms will choose flavor over performance. That is why it becomes so vitally important for you to find good representatives to work with from your seed company.

Almost all of these new types have better flavor than their old counterparts. Some also have better performance. These new genetics represent the future of the corn industry.