‘Pennfresh ADX’ Hybrid Sweet Corn¹

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‘Pennfresh ADX’ is a high-sugar sweet corn hybrid (Zea mays L.) based on the recessive endosperm gene combination amylose-extender (ae) dull (du) waxy (wx). The effects of this gene interaction on starch and sugar properties were reported by Creech (1). This hybrid can be harvested over a longer period than traditional sweet corns which are homozygous for the sugary (su) gene, and it retains its quality much longer following harvest. The symbol ADX is used to delineate this new class of sweet corn hybrids.

Origin

‘Pennfresh ADX’ is produced by crossing the PAIA453 ae du wx inbred by the PAIA5125 ae du wx inbred. To develop these 2 inbreds, the recessive alleles ae, du, and wx were incorporated into the sweet corn inbreds IA453 and IA5125 by backcrossing for 5-7 generations. Following backcrossing, homozygous ae du wx genotypes were selected during several generations of self-pollination, and the su allele replaced by the nonmutant or normal allele (Su).

Description

‘Pennfresh ADX’ is related to the sweet corn cultivar ‘Iochief’ and is very similar to it in many aspects. This yellow-kernel hybrid matures about 88 days after planting and is adapted to the same area as ‘Iochief’. ‘Pennfresh ADX’ grows to a height of about 180 cm with few tillers. Ears have only a few flag leaves. Unhusked ear length varies from 23-25 cm at 35,000 plants per ha to 20-23 cm at 50,000 plants per ha. Unhusked ear weight varies from 340-360 g per ear at 35,000 plants per ha to 270-320 g per ear at 50,000 plants per ha. The average kernel row number is 16. Using the terminology of Garwood and Creech (2), the mature kernel phenotype can be described as translucent (occasionally opaque) and semi-collapsed. Yields are comparable to those of traditional sweet corn hybrids (5). Acceptable germination (81%) has been observed using a cold stress test procedure that involves 7 days at 10°C followed by 5 days at 25°C. Under less stringent environmental conditions, germination approaches 100%.

‘Pennfresh ADX’ contains more sucrose than traditional sweet corn; however, it is not as sweet as ‘Illini Xtra-Sweet’ (3). The sugar level may be optimal since 19% of the consumers sampled by Showalter and Miller (6) found ‘Illini Xtra-Sweet’ to be objectionably sweet. ‘Pennfresh ADX’ remains sweet longer after picking than ‘Iochief’ (3). After 4 days at 27°C, ‘Pennfresh ADX’ contained almost as much sucrose as that in freshly picked ears of ‘Iochief’. When stored at 40°C for 4 days, almost all of the sucrose was retained in ‘Pennfresh ADX’ (3). Additional data on ears harvested at various days postpollination indicates that high levels of sugar are present for at least 10 days starting at 16 days after pollination (5).

Informally conducted taste evaluations of fresh ears by personnel at the Pennsylvania State University and Pennsylvania vegetable growers have demonstrated the excellent flavor and taste of this hybrid. Tests have also shown that ‘Pennfresh ADX’ is good when frozen or canned (3).

Compared to normal starch granules, starch granules from endosperms homozygous for ae are known to be resistant to hydrolysis by amylase while wx starch granules are hydrolyzed more rapidly. The starch granules from ae du wx do not exhibit the indigestibility associated with ae starch, and in fact ae du wx starch granules are hydrolyzed more rapidly than normal or wx starch granules (4). Thus, carbohydrate availability is not reduced in ‘Pennfresh ADX’.

Outstanding characteristics

‘Pennfresh ADX’ contains a unique combination of genetic factors producing excellent sweetness, flavor, and texture without becoming too sweet. Additionally, this hybrid has good sugar retention both in the field and after it is harvested. It is the only commercial sweet corn based on the ae du wx gene combination. When ‘Pennfresh ADX’ crosses with any other type of corn, easily recognized full, starchy kernels will be produced.

Availability

Seed of ‘Pennfresh ADX’ was released to the ADX Corn Production and Introduction Company, A Pennsylvania Partnership. Partners include Agway, Inc. and Green Giant Development Company. Seed is available from Agway, Inc., Box 4933, Syracuse, NY 13201.

Literature Cited