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Impact of Low Temperature Conditions on Early Seedling Growth in Sweet Corn (*Zea mays* var. *saccharata*)

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Sweet corn is mostly cultivated throughout the winter months. Low temperatures (10ºC) have a negative impact on seed germination, field emergence, seedling development, and crop stand during the winter season (December-February) (Parera *et al*., 1996) and are a key bottleneck in sweet corn production in farmers' fields. The current study focuses on evaluating sweet corn performance under low temperature conditions.

Sweet corn is extensively farmed and consumed as a source of fibre, minerals, and vitamins (Chhabra *et al*., 2019), and its kernel sweetness and texture are significant components for eating quality. Its key eating quality components are connected with kernel sweetness and taste panel preferences. Consumers prefer its genotypes with *sh*2 or *sulse*l in taste. Endosperm mutants such as *shrunken*2, *brittle*1, *sugary*1, and sugary booster are utilised to improve kernel sugar concentration. Where the *shrunken*2 (*sh*2) mutants contain the most sucrose (29.9%).

Sweet corn (*Zea mays* var. *saccharata*) is typically planted in soil at suboptimal temperatures in early spring and summer. Cold stress has an impact on agricultural plant life cycles and productivity throughout the early phases of growth. Cold temperatures have a significant impact on membrane permeability, seed osmotic potential, and photosynthetic rate in plants. Temperature during early seedling development determines seedling performance during early germination. Chilling temperature is a significant limitation for maize plants during seed germination and early seedling development (Guan *et al*., 2009). Douglass *et al*., (1993) found that *su*1*se*1 hybrids exhibited lower emergence and early seedling vigour than su1 hybrids, especially when cultivated in cold soils. The *su*1*se*1-based hybrid's emergent and seedling vigour under low temperature may be increased by employing su1 inbred that could be screened under artificial settings in growth chambers and field situations (Ordas *et al*., 2006). Super sweet corn with *sh*2 has worse cell membrane integrity, more electrolyte leakage, and lower vigour with less cold resistance than sugar-enhanced (*se*1) super sweet corn (Tao and Zheng, 1991). Hassel *et al*., (2003) evaluated twenty-seven sweet corn *su* (*sugary*), *se* (*sugar enhancer*), and *sh*2 (*shrunken*-2) types to determine the time required to attain the minimum acceptable germination percentage (MAGP) under varied temperature regimes (11.1ºC to 30ºC). Sugary, sugar enhancer *shrunken*-2 kinds germinated in 4 or 5 days, respectively. Because none of the *shrunken*-2 cultivars obtained MAGP in 7 days at 11.1°C as discovered in sugary and sugar enhancer cultivars, all *shrunken*-2 cultivars required a higher temperature for minimum germination than sugar enhancer and sugary cultivars. He determined that the *su* sweet corn was more cold resistant than the *se*1 and *sh*2 assessed for cold planting. Combining the *bt* or *sh*2 genes with the maize *wx* gene resulted in low germination percentage and seedling vigour in sweet corn.

Wilson *et al*., (1998) proposed that seed vigour in extremely sweet corn might be inadequate despite a high standard germination percentage. As a result, traditional germination assays useful for assessing seed vigour in common corn were ineffective for sweet corn. Germination percentage in maize is highly associated with field emergence percentage (Liu *et al*., 2004). Cold temperatures has a significant impact on maize seed quality. However, genotypes with compact root systems has superior metabolic activities and a higher tolerance to unfavourable circumstances, and physiological damage lowered seedling vigour and survival. Emergence percentage is demonstrated to be having good heritability and genotypic connection with seed vigour variables evaluated and has the potential to be employed as a selection criterion for early field vigour and stand establishment (Adetimirin, 2008). Mirosavljevic *et al*., (2013) discovered that stress negatively influenced plant shoot length, root length, shoot weight, root weight, germination energy, and rate of germination. Thus, agricultural plant tolerance was required for high vigour, growth, and resistance to damage caused by insects and pests, resulting in increased output. Thus, temperature during early seedling development determines seedling performance during early growth. Chilling temperature has a significant limitation for maize plants during seed germination and early seedling development.

Key words: Seed germination, Sweet corn, low temperature, vigour and *shrunken*2.

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