

FIELD-SCALE SPATIAL STRUCTURE OF CORN STUNT DISEASE COMPLEX IN MAIZE

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Corn stunt disease complex (CSDC) is a major threat to maize production in the Americas, caused by mollicutes and viruses transmitted by the leafhopper *Dalbulus maidis*. Although infections can occur early, symptoms usually appear during the reproductive stage, hindering early diagnosis. This study analyzed the spatial pattern of CSDC symptom severity in maize fields under natural infection. Three experimental fields (A1, A2, A3) were established in 2024-2025 with spacings of 0.20 × 0.60 m (A1) and 0.20 × 0.80 m (A2, A3). Field A1 consisted of 36 strips with alternating hybrids (KWS7510 and AG7098), whereas A2 and A3 were planted exclusively with KWS7510. Disease severity was assessed once between the R2 and R4 stages using an ordinal scale from 1 (asymptomatic) to 6 (maximum severity). Randomly selected plants (A1: 348; A2: 220; A3: 226) provided full spatial coverage. Spatial autocorrelation of ordinal severity scores (1-6) was evaluated using Moran's I with permutation inference (999 runs), and local dependence was examined using rank-based LISA with FDR-adjusted p-values to detect high- and low-severity clusters. Cluster detection was also performed with SaTScan using the ordinal model. Mean severity values were 3.38 in A1, 3.68 in A2, and 3.69 in A3, indicating moderate to high symptom expression across fields. Field A1 exhibited a random pattern ($I = -0.20$; $p = 0.67$), whereas A2 ($I = 0.17$; $p < 0.01$) and A3 ($I = 0.11$; $p < 0.01$) showed aggregation. LISA revealed high-severity hotspots along the lower and upper edges of A2 and A3. SaTScan identified one significant cluster in A2 ($p < 0.01$) with a 12 m radius located on the southeastern edge, corresponding to plants with elevated severity. Overall, CSDC severity was aggregated, with higher severity at field edges than in interior areas. These findings highlight the influence of spatial factors and vector dynamics, supporting improved disease management strategies.

Palavras-chave: Vector-borne disease; SaTScan; Spatial pattern

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