



**RegenPGC Graduate  
Education Community**

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### **How Far Is Far Enough? Optimal Crop Zone for Corn in a Perennial Ground Cover System**

**Abstract** Farming has gradually shifted toward intensive monoculture systems dominated by annual cash crops, often replacing native perennial groundcovers. While this approach has increased short-term productivity, it has also led to widespread topsoil loss through wind and water erosion, along with agrochemical runoff that pollutes water bodies and threatens aquatic ecosystems. Perennial groundcover (PGC) systems have emerged as a sustainable alternative, offering year-round soil protection and reduced input costs. However, competition between PGC and corn remains a major barrier to adoption, due to limited information on the optimal crop zone.

This two-year field study investigated the influence of spatial proximity to a Kentucky bluegrass PGC on corn growth, development, and yield. Using a split-plot randomized complete block design, two commercial corn hybrids with differing shade avoidance responses and two nitrogen starter fertilizer treatments were evaluated. Corn was planted at a 14° angle from the PGC, and emergence timing, plant morphology, and yield components were measured at the individual plant level.

The study found that corn planted below 25–30 cm of perennial groundcover (PGC) experienced delayed emergence, reduced height, narrower stems, and lower chlorophyll content. Yield improved significantly at above 30 cm, where performance was statistically like control plants growing beyond 75 cm. These gains were driven by increases in kernel number and weight, indicating a competitive relief zone beyond 25 cm for morphological traits and yield. Starter nitrogen fertilizer had a minimal impact under high competition, while hybrid selection for shade avoidance response exhibited greater resilience. These findings highlight 25 cm as a critical buffer distance for corn morphological growth and yield in PGC systems.

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