

Effects of Fertilizer and Irrigation on Corn Growth Traits

Trait	Fertilizer Effect	Irrigation Effect
Stalk Height	Increased fertilizer, especially potassium (K), improves stalk strength and can increase stalk diameter and height. High fertility at normal density yields the strongest stalks ^[1] .	Adequate irrigation supports maximum stalk growth; drought or water stress during vegetative and early reproductive stages can reduce final stalk height ^[2] .
Leaf Area	Mineral fertilizers (NPK) significantly increase leaf surface area—by 11,000 to 15,560 m ² /ha compared to unfertilized controls ^[3] .	Sufficient water is crucial for full leaf expansion; water stress during vegetative growth reduces leaf area ^[2] .
Total Number of Leaves	Fertilizer increases leaf area but has minimal effect on the total number of leaves, which is primarily determined by genetics ^[3] .	Irrigation does not significantly affect the total number of leaves, but severe drought can cause early senescence of lower leaves ^[2] .
Flower/Tassel Size	Adequate N and K are required for proper tassel and ear formation; deficiencies can reduce tassel size and pollination success ^[4] .	Water stress during tasseling and silking can reduce tassel size and pollen viability, impacting pollination ^[2] .
Cob Size	Higher NPK rates increase cob length, weight, and grain yield. Conventional fertilizer yields the largest cobs and grain weights ^{[5] [6]} .	Cob size is highly sensitive to water availability, especially from tasseling through grain fill; drought during this period sharply reduces cob size and kernel number ^[2] .

Key Points

- **Fertilizer** (especially NPK) is critical for maximizing leaf area, cob size, and yield, and for supporting strong stalks and proper tassel development^{[1] [3] [4] [5] [6]}.
- **Irrigation** is most crucial during the reproductive stages; water stress during tasseling, silking, and grain fill can severely limit cob size and overall yield^[2].
- **Total number of leaves** is mainly controlled by genetics, with fertilizer and irrigation primarily affecting leaf size and longevity rather than number^{[3] [2]}.

Both fertilizer and irrigation are essential for realizing the genetic potential of corn, particularly for maximizing stalk height, leaf area, and cob development. Deficiencies in either input during critical growth windows can significantly reduce crop performance and yield.

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1. https://www.premieragsource.com/webres/File/agronomy/fertility/ais583_Corn_K_Fertilizer_Stalk_Strength_CI050422.pdf

2. <https://www.cropscience.bayer.us/articles/bayer/corn-irrigation-timing>
3. https://www.bio-conferences.org/articles/bioconf/full_html/2020/01/bioconf_fies2020_00074/bioconf_fies2020_00074.html
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