perplexity

Do fertilizer and irrigation affect growth rate of stalk height, leaf area, number of leaves, tassel size, and/or cob mass?

Fertilizer and irrigation both have significant effects on the **growth rate** and final development of corn stalks, leaves, tassels, and cobs, but the degree and nature of these effects vary by trait:

Effects on Corn Growth Traits

Trait	Fertilizer Effect	Irrigation Effect
Stalk Height	Increased fertilizer, especially nitrogen, accelerates stalk growth and results in taller plants [1] [2].	Adequate irrigation supports taller stalks; water stress reduces height and growth rate [3] [4] [5].
Leaf Area	Fertilizer (N and NPK) significantly increases leaf area and speeds up leaf expansion [1] [2].	Sufficient irrigation is crucial for full leaf expansion; drought reduces leaf area and slows growth [3] [4].
Number of Leaves	Fertilizer can slightly increase leaf number, but genetics is primary determinant [1].	Water stress reduces total leaf number by slowing or halting leaf emergence and increasing leaf senescence [3].
Tassel Size	Adequate fertilizer, especially nitrogen, supports normal tassel development; deficiency can reduce tassel size [1].	Water stress during tasseling can reduce tassel size and hasten flowering, limiting pollen production [3].
Cob Mass	Higher fertilizer rates (especially N and K) increase cob size and kernel number; optimal rates maximize cob mass [2].	Water stress during reproductive stages (tasseling, silking, grain fill) reduces cob mass and kernel set [3] [5].

Summary of Growth Rate Effects

- **Fertilizer**: Boosts growth rate of stalk height and leaf area, and can slightly increase the speed to tasseling and cob development. Over- or under-fertilization can reduce yield and growth efficiency [1] [4] [2].
- **Irrigation**: Consistent and adequate water is essential for rapid and sustained growth of stalks and leaves. Water deficit slows or stunts growth, reduces leaf and cob development, and can accelerate flowering as a stress response [3] [5].

In summary:
Both fertilizer and irrigation are critical for maximizing the growth rate and final size of corn stalks, leaves, tassels, and cobs. Fertilizer mainly drives nutrient availability and vegetative vigor, while irrigation ensures the physiological processes required for sustained growth and reproductive success [1] [3] [4] [2] [5]. Water and nutrient stress at key stages can significantly reduce all major growth parameters.

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1. https://files.sdiarticle5.com/wp-content/uploads/2025/02/Rev_AJAHR_130390_Azi_A.pdf
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