

## Corn studies examine photosynthesis

UNIVERSITY PARK — Exploring ways to improve the ability of corn plants to convert solar energy into increased yields is a key goal of crop scientists at Penn State.

Daniel P. Knievel and Jack C. Shannon in agronomy are working to improve the efficiency of corn plants to produce high levels of carbohydrates through the natural process of photosynthesis. They call carbohydrates the vital "building blocks" of plant growth.

Knievel said the complex process of converting solar energy into grain in corn plants is two-fold. In addition to high rates of photosynthesis, plants must have the capacity to accumulate and store efficiently the resulting high levels of carbohydrates as grain.

"Improved carbohydrate storage is essential," he said, "since high photosynthetic rates do not necessarily lead to high grain production. That's the crux of the problem," he affirmed.

Experiments at Penn State show that, after pollination, carbohydrates can accumulate in corn plants during periods of high photosynthesis but without increasing the growth rate of the developing grain.

"To complicate the situation, we

also found that corn plants accumulating high carbohydrate levels in their tissues during grain filling had lower than normal rates of photosynthesis," Knievel stated.

This means, he noted, that a scientific "breakthrough" to increase plant photosynthesis would not, by itself, improve crop yields. Corn plants would need the genetic ability to accept and convert additional carbohydrates into grain. The growing crop also must be managed properly to fully utilize the improved potential, he added.

The Penn Staters have grown corn at high and low populations to vary the degree of shading between plants. This helps to control the level of photosynthetic energy in the plant. Pollination was done by hand to control the number of grains per plant.

Accumulation of carbohydrates in stalk tissue was high, it was observed, when the kernels were unable to accept all of the available energy from photosynthesis.

Rate of grain growth in each kernel was the same for all treatments, regardless of the number of kernels per ear. Where kernel numbers were low, plants stored higher amounts of carbohydrates in stalk tissues than were kernel numbers were high.

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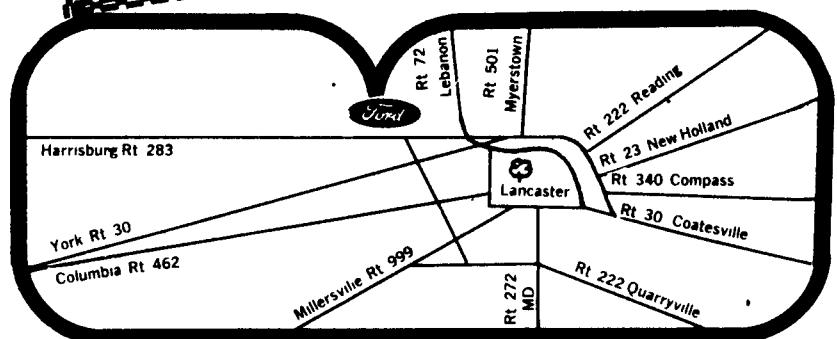


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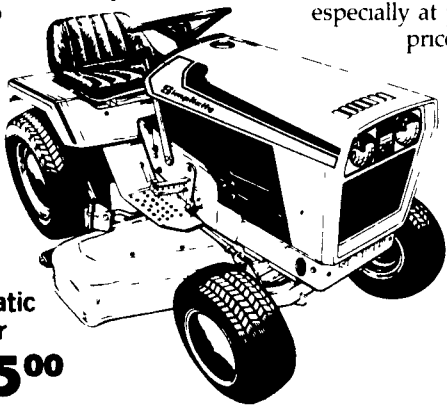
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