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THE OHIO STATE UNIVERSITY EXTENSION

Extension FactSheet

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Soybean Plant Spacing, The Last Frontier

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The ideal plant spacing for any crop is one where each plant is the same distance from each of its neighbors (equidistant spacing). The actual amount of space needed by a plant to perform well is a function of its size. For example; 30,000 corn plants per acre is realistic for high yields of corn. For soybeans, a smaller plant, about 150,000 per acre is usually associated with high yields. Wheat, a smaller plant yet, requires about 1,250,000 plants per acre for best yields, while a bluegrass sod may have as many as 30,000,000 plants per acre in contrast to an apple orchard with only 50 plants per acre.

1. Most crops are "self-thinning" and can tolerate a wide range in population and still produce somewhat normal yields. Over time, crop producers have used this tolerance of population to force crop plants to grow in rows that are conducive to mechanical culture. Typically, the root systems of adjacent plants do not intermingle or grow into the same volume of soil. For closely spaced plants in wide rows, their root systems are confined to areas a few inches wide, 2–3 feet long and 1– 6 feet deep. A single plant with no nearby neighbors will normally have a root system that is cylindrical in shape. The above-ground growth is less restricted, but plants still respect their neighbors' space. This restriction of normal growth patterns reduces the per-plant yield but usually increases the yield per unit of area or space.

As we have improved cultural systems and soil productivity, plants have become more tolerant to crowding. However, if the spacing between plants is too small, they may devote all their energy to competing for space and other resources rather than produce the products we need; and the weaker ones often die (self-thinning).

We have all observed that two plants growing really close together do not produce well, while other plants can compensate completely for a missing neighbor. As a general rule, skips in the row equal to the spacing between rows are no more yield reducing than the spacing between rows. Plants grow to the degree needed to explore the space available and exploit the resources (sunlight, water, nutrients, carbon dioxide, and oxygen) contained therein.

Most modern planting equipment can be configured to generate any spacing between rows, but most grain drills are not capable of spacing seed at uniform distances within the row. Some planters and drills use either vacuum or air pressure to meter seed and can place seed at very uniform spacings in the row relative to fluted metering devices. For yields greater than 180 bushels of corn, 60 bushels of soybeans, and 80 bushels of wheat, the uniformity of plant spacing in the row can be yield limiting.

2. As high-tech seeds (Roundup Ready and other new technologies) become more expensive, there is an increasing need for more accurate metering and spacing of seeds in the row. As we attempt to "plant to stand," there is an increased need to protect seeds from disease, insects, and adverse environmental factors using various seed treatments or coatings, which may alter the accuracy of some seed-metering systems. Seed metering devices must be capable of accommodating those additives and meter seed accurately.

The effect of nonuniform seed spacing can be seen in the results of a number of studies conducted with corn, which indicated that most planters can meter the correct number of seeds per acre. However, some planters did not space seed uniformly within the row. When two seeds were placed together in the row, both plants were either barren or produced very small ears which resulted in yield reductions of up to 20 percent depending on the frequency of double placement.

For any crop, the individual plants must be of adequate size and command enough space and resources to produce a normal amount of grain per plant, which is typically 35 to 45 percent of the plants' total above-ground mass at harvest. Plants that fail to produce that amount of grain waste environmental resources which we recognize as reduced yields.

The best measure of a quality planting job is not the number of plants but the uniformity of their spacing in the row. All seeding equipment must provide accurate and uniform seed spacing and planting depth as a prerequisite to better yields and larger profits.

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