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An Aid for Determining Stage of Potato Plant Growth

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Determining the stage of growth of potato plants is sometimes difficult and confusing. Previous publications from this station (1,2) have shown relationships of height, size, and inflorescences to the stages of potato plant development and growth. Presented here is additional information and illustrations which help define the stages of potato plant growth.

The Russet Burbank variety of potato is fairly upright in growth with a semi-determinate flowering habit. After the seedpiece or tuber sprouts, the primary stem will grow until the first inflorescence (flower head) forms. As the first inflorescence develops, a secondary or lateral stem starts to differentiate, usually from a bud at the base or axil of the second leaf below the peduncle (flower stalk). This secondary stem will grow until it is taller than the first inflorescence, and it also terminates in an inflorescence. A third set of branches may appear, again terminating in an inflorescence.

Fig. 1

Fig. 2

For an accurate determination of the stage of growth, therefore, the main or primary stem must be correctly identified and the actual numbers and developmental stages of inflorescences or flower stalks must be determined.

We can determine stage of growth of the Russet Burbank potato quite accurately by measuring the height of the plant and by examining the position and the condition of the inflorescence. However, when defoliation occurs, especially from hail, height of the plant and development of the inflorescences may be altered to such an extent that the exact stage of growth of the plant is difficult to determine. Also, in most cases, defoliating a potato plant in early growth causes it to start new growth which very quickly may grow beyond the position of the primary flower stalk. For these reasons, we have sought a more accurate and easier method to determine stage of growth at time of defoliation.

By observing and counting nodes on several hundred potato plants of various varieties and species, we have determined that, on the average, the first inflorescence occurs at the 11th or 12th node of the potato plant (Fig. 1). The exact number may vary from 9 to 14 nodes.

As soon as the flower buds on the primary inflorescence begin to develop and expand, a lateral bud begins to grow from the axil of the second leaf below the flower stalk. A secondary inflorescence will develop at about the 11th node of this stem (Fig. 2). Here again, in the potato plants studied, the number of nodes from the leaf axil to the inflorescence varied from 9 to 13, but the average was about 11.

When seasonal conditions permit more growth, a third stem will begin from the bud at the base of the first or second true leaf below the secondary flower stalk and will grow until another inflorescence is formed at about the 11th node (Fig. 3).

Matching Plant Appearance, Inflorescences And Stages of Potato Plant Growth

The number of nodes from the ground line to the first inflorescence, number of nodes between inflorescenses, and the development of the inflorescences are the best criteria in determining stage of growth of Russet Burbank potato plants. This seems to be true for other varieties and other species of potatoes as well.

The relationship of previously defined stages of potato plant growth (1) to the node and inflorescence system is as follows:

(1) **6 to 8 inch**—This stage of growth can be determined by actual measure but delayed irrigation, cool weather, frost, or poor growing conditions can delay actual plant growth. A better method is to examine the plant for flower buds. At this stage, the plant has no flower ends. It will have from 6 to 8 readily discernible nodes on the main stem. In a few plants, very small tubers have formed, ranging from pea size to less than ½ inch in diameter.

(2) **8 to 12 inch**—This stage of growth can also be determined by actual measurement. More importantly, the main stem will have 10 to 12 discernible nodes and small buds will be present at the very top of the plant. The flower stalk will not be elongated and the buds will still be in a cluster. Some plants will have small tubers up to ½ inch in diameter.

(3) **12 to 15 inch**—This stage of growth can again be determined by actual measurement. But to determine more accurately, examine the plant for buds. The primary inflorescence will show above the leaves and will have large numbers of buds.

There will be little or no extension of a secondary shoot. The plant will probably have developed small tubers. This stage of growth occurs after the buds are formed but before the blossoms open. Growth of plants is rapid during this period.

(4) **50 percent full bloom**—This stage of growth occurs when the blossoms on the primary florescence have begun to open and the secondary or lateral stem has elongated by several nodes. The secondary stem has not elongated enough to cover up the primary inflorescence but has already begun to form buds. Tubers will range from ½ to 2 inches in diameter; some may be up to 3 inches in length and weigh as much as 4 to 5 ounces. Most tubers at this stage of growth are still round in shape.

(5) **Full bloom**—At full bloom, most flowers on the primary inflorescence will be open and fully expanded. The rest will already have dropped off and abscission layers will show at the ends of the pedicels where these flowers were. At about the 11th node above the primary flowers, a secondary stem will have flower buds and, in some cases, open flowers. The tubers at this stage of growth will range from 1 inch in diameter up to 5 or 6 ounces in weight. One or two tubers on each plant will already exceed the U.S. No. 1 minimums of 4 ounces in weight or 2 inches in diameter. The majority will still be somewhat round in shape, but the largest tubers will have the shape and appearance of the Russet Burbank.

(6) **Past full bloom**—Past full bloom stage is indicated when the majority of first blooms have fallen. The secondary blossoms will be open and a few third-order stems and inflorescences will have formed. The presence of the third-order stems and flower buds distinguishes this stage from the full bloom stage. There may be abscission layers on some of the pedicels of the secondary inflorescences. The tubers at this stage will range from 1 to 1½ inches in diameter up to 6 to 10 ounces in weight. Most of the tubers will show the characteristic long, slightly flattened shape of the Russet Burbank.

(7) **Full grown**—At this stage of growth, all flowers on the primary inflorescence and most of those on the secondary inflorescence have fallen. Some of the third-order flowers have opened or have abscissed. This stage is also distinguished by the number of third-order flower buds and stems present. The third-order inflorescence will again be about 11 nodes above the second-order inflorescence on the same stem. In most years, there will be two or more third-order stems present to each plant. However, not all will have a third-order branch or inflorescence. Very little plant growth occurs after this stage. The tubers will range in size from a hen's egg up to 10 ounces or larger. Increases in yield after the plants reach this stage are from growth or tubers already formed rather than from an increase in the number of tubers.

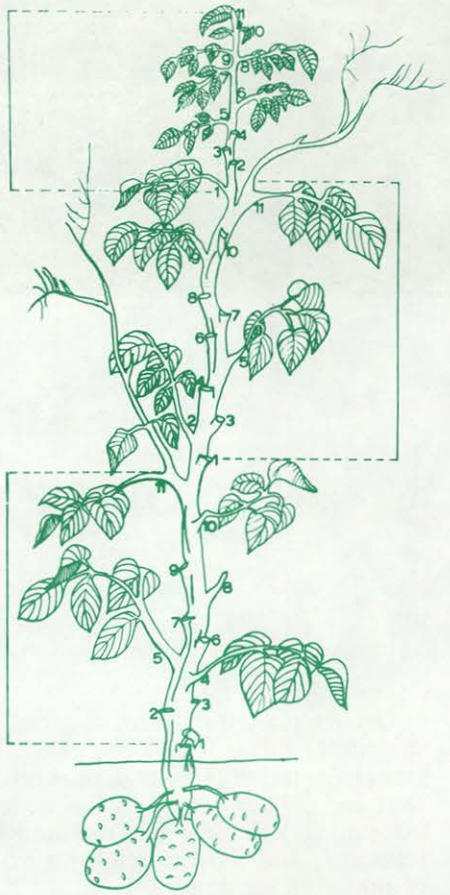

Fig. 3

(8) **Near maturity**—At this stage of growth, the vines will be changing color, and no blossoms will occur except on plants affected by disease or delayed in some other way. Tubers will continue to increase in size.

(9) **Maturity**—The plants have become light green in color and many of the lower leaves will be yellowish or will have fallen off. No blossoms will be present. The skin of the tubers will have set and will not slip easily. Very little yield increase can be expected after this stage of growth.

1. Sparks, Walter C., Woodbury, George W., and Takatori, Frank H. 1957. Estimating Hail Injury in Potatoes. Idaho Agr. Exp. Sta. Bul. 274.
2. Sparks, Walter C., and Woodbury, George W., 1959. (Rev. 1967). Stages of Potato Plant Growth. Idaho Agr. Exp. Sta. Bul. 309.

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