TRANSFERRING PHOTOSYNTHATES OUT OF THE LEAVES ... WHAT CAUSES IT?

The combination of Auxins and Cytokinins determine where leaf buds occur. As the leaf begins to grow, Auxins direct "food flow" from developed leaves into the new leaves. This continues until the new leaf reaches about one-third in size.

After the new leaf obtains this size, gibberellic acid (GA) becomes the dominate hormone…for cell sizing. At this time, the new leaf is manufacturing its own photosynthates and storing them in their cells.

It now becomes clear that Auxins (IAA) direct the flow of photosynthates into the new tissue (organ). It is GA; however, that determines the rate of flow on photosynthates for cell sizing.

The amount of photosynthates that are produced and stored in leaf cells depend on:

1. General plant nutrition
2. The amount of potassium in the cell to regulate cell wall pH.
3. The amount of polyamines in the cell to regulate cell wall pH.
4. The amount of calcium for strong cell wall formation.

After the leaf reaches its maximum size, it waits for a signal to transfer food from the cells to the developing plant organs.

1. New leaves
2. New roots
3. Seed or storage tissues

There are two hormones that are primarily involved in transferring photosynthates:

1. Auxins (IAA) which signal the direction of food flow.
    A. Seeds have stronger signal.
    B. Leaves have next stronger signal.
    C. Roots have the weakest signal.

One can now understand why roots start to die after seeds appear on the plant…they starve.

2. Abscissic Acid (ABA) will build up in the leaf in order to weaken cells….increased cell wall permeability so that photosynthates can move out of the cell into the phloem tissue.

Following is the sequence of events that discharge photosynthates from the cells into the phloem tissue (for transport to other organs).

1. K+ moves out of the cell by a pump…ATP ASE Mg pumps.
2. H+ moves into the cell and makes it acid.
3. ABA enters the cell wall so that photosynthates can move out of the cell.

If the ABA level is too high, the leaf will quietly die. This is not good.

For maximum yields, photosynthates discharge should be released over a long period of time…not fast. This is determined by the hormone cytokinin.

Since cytokinin is produced in the roots, early dying of leaves depends on new root growth.

Since roots begin to stress after seeds come on the plant, the dying process of leaves will begin during the reproductive phase of any crop.

The above is a natural cycle. We can extend this cycle and have higher yields, if we understand The Language of the Plant.