The Language of the Potato Plant (2)

Whenever GA dominates a potato plant, there are several things that are quite noticeable:

1. The stolen length increases. This indicates that in the presence of high levels of GA, insufficient sugars transported from the leaves to the stolen in order to enable the stolen to hook.

2. The internode length of the above ground parts tends to lengthen. This normally occurs under conditions where GA is dominant. When trying to obtain the maximum yield and quality of a plant, the activity of GA must be controlled so it does not dominate the cells in the plant.

The growing areas where GA tends to be less of a problem are in those areas where the nighttime temperature drops below 70ºF (21ºC). These are normally temperatures that occur under desert growing conditions and areas which are further away from the Equator. Historically, these are the areas where potato production develops. These conditions also occur in the high mountainous areas. Again, this originally where the potato plant developed.

There are several practices that enable GA to dominant the plant. The most single common practice is the application of abundant amount of nitrates to the crop. Nitrates will always inhibit the activity of IAA in the plant tissue. This results in a quicker dominance of GA in the plant cells.

3. The abundant amount of cytokinin will enable the IAA to maintain its dominance in the plant cell and delay the dominance of GA. Therefore, high rates of cytokinin can be used to control the activity of GA.

4. The use of boron will delay the IAA oxidase which allows the GA to take over the dominance of a plant cell. Therefore, abundant uses of boron will diminish GA's ability to take over and control the plant cell.

As one can imagine, different potato varieties are more sensitive to GA dominance. If one wanted to make a blanket statement, it would go such as this, "Potato varieties that have short stolons are normally less subject to GA dominance." These varieties will normally size the tubers more rapidly than the varieties which normally have longer stolons. The problem, however, these varieties tend to die earlier because of the excessive bulking of the tubers. They also tend to have less of a plant canopy.

When one considers the above, we are presented with an interesting set of problems. The farmers will always use high levels of nitrogen when growing potatoes. There is very little way of insolence over this practice. The best possible thing is that we try to convert them to "Nitro Plus" rather than the regular nitrates that they now are using.

On potato varieties that have short stolons (lack of GA dominance) it would be well for us to consider increasing the GA supply to these varieties. This may slow down the rate of bulking, but it might also extend the life of the plant so that the total yields may be greater. This is what happens when you use Quadris. It inhibits IAA transport so that there is less IAA in the tubers. This allows GA to dominate the way the tubers size.

When growing varieties that have long stolons, it appears that it would be necessary for us to control the activity and inhibit the activity of GA. Under these varietal conditions, we need to apply an abundance of auxin and cytokinin to the rooting area of the plant. This is particularly important around the tuber zone.

If the above reasoning is correct, we are now equipped with the information that will enable us to handle all potato varieties grown in areas where the nighttime temperature seldom goes below 70ºF (21ºC). On varieties that tend to have longer stolons and are more dominated by GA activity, it is more important for us to use Nitro Plus and boron to the center pivot irrigation system or side dressed to the crop. This is not as necessary on the short stolon varieties.

5. On these long stolon varieties we also need to apply periodic applications of auxins and cytokinins to the rooting area. This should control the GA and result in short stolenization and more rapid development of the tubers. It should also make the tubers less susceptible to disease and storage problems.

On the other hand, the short stolon varieties may need additional GA later in the season when they normally want to die. Farmers usually apply nitrates in order to lower the IAA and allow GA to dominate during the periods of senescence. This is a waste of money. It may be more practical to applied GA directly to the foliage of these crops in lieu of the use of nitrogen.

If the above concept is true, if we want to keep the plant alive a longer period of time, foliar applications of GA should do so. The reason that Quadris keeps the plants alive for a longer period of time is that it reduces IAA transport and allows GA to dominate.

When using GA late in the season, it is probably very important not to over dose. We do not want to have large cells develop in the tubers during the later stages of growth. We do not want to inhibit the level of ABA to build in the tubers, as it will result in poor storage. It may also result in more disease. Therefore, it is necessary to judiciously use GA in order to inhibit plant dying by not effect the quality of the tubers and the maturity of the tubers late in the season.

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