



PAN ALL PULSE BULLETIN #9 - APRIL 14, 2005

IN THIS ISSUE...

- **Glyphosate Residue In Seed - Effects On Nodulation**
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In the March 1, PAN Bulletin Sarah Foster-Stubbs at 20/20 Seed Labs indicated they were finding the following, “Chemically damaged seedlings observed during germination are higher than usual due to the use of glyphosate pre-harvest desiccants.”

As we know, glyphosate residue within seed results in increased field mortality of both germinating seed and seedlings. Seedlings that do survive are often noticeably lacking in vigour. This characteristic of reduced vigour is due, in most part, to the development of abnormal root systems of the pulse crop. Roots tend to be gnarled and twisted with little branching or lateral root branch development. Importantly, roots that develop are devoid of root hair development. We also know that seed from plants where glyphosate was applied for pre-harvest management should not be used for planting, however.....

As a pulse crop seed germinates and begins to develop into a seedling it produces chemical compounds out into the soil environment that signal the appropriate species of *Rhizobium*, informing the bacteria of its presence. The bacteria in turn release compounds which the plant “reads”. This prepares the seedling for the arrival of the bacteria. The point of infection of the bacteria into the plant occurs via a root hair. The tip of the root hair bends and the bacteria penetrate the root hair on the inside junction of this bend. A number of physiological and morphological changes occur but for all intentional purposes the root hair curls around this infection point and the net effect is the development of a nodule. It’s worth keeping in mind on July 1st when you’re checking for nodulation that those tumors your viewing were once root hairs.

If glyphosate damaged seedlings result in fewer, if any root hair development, the point of infection is now removed from the nitrogen fixation system. No symbiotic relationship can develop when the bacteria are effectively “locked out.” Consequently no matter how well, how much, or what form of inoculant was applied with the seed, an inoculant failure will occur. It’s a no win situation from the start.
