Impact of Glyphosate Drift on Potato Yields and Subsequent Performance of Seed Potatoes

Potatoes are commonly exposed to accidental drift from nearby application of non-selective systemic herbicides like glyphosate (Roundup, Rustler, Touchdown etc). Exposure can occur early in the growing season as a function of spraying to control weeds on fallow land and in herbicide resistant crops (ie; canola). Later in the year these products are used for pre-harvest desiccation of pulses, oilseeds and cereal crops. Researchers at North Dakota State University studied the impact of simulated glyphosate drift on the yields and crop quality of Russet Burbank potatoes. As expected, they found that the degree of crop damage increased with the dosage of glyphosate absorbed by the potato crop. In general, the earlier the exposure the greater the reduction in yields associated with exposure to herbicide drift ie; hooking stages > tuber set > tuber bulking). Yield loss was primarily due to a reduction in tuber biomass rather than any increase in cullage rates.

More recent research has looked at the impact of glyphosate drift on yields of Ranger Russet and then tested how well the spray-affected crop performed if used as seed. As seen in the previous study with Burbank, yields of Ranger decreased as the dosage of glyphosate increased – but yield losses were observed even at the lowest concentration tested (1/100 of standard spray concentration). As noted in the previous study, the impact of spray damage on yields was greatest if the potato crop was exposed at an early stage of development. The stunting and leaf chlorosis typically caused by exposure to glyphosate were easily detected in young plants but obvious symptoms of spray damage were often absent when the crop was sprayed at a later stage of development. This is significant, as crops sprayed late in the growing season (ie; at tuber bulking) showed the most damage when used as seed. For example, if a crop was exposed to glyphosate during tuber bulking and then used as seed, over 70% of the seed pieces failed to produce a viable plant. By contrast, if the mother crop was exposed to glyphosate drift at an earlier growth (ie; hooking or tuber set) the drift event had very little impact on sprouting of the seed tubers or on subsequent growth or yields. Exposure to glyphosate can cause the affected crop to produce distorted tubers, which can be graded out before the crop goes to market or is used as seed. However, when the apparently sound tubers from a spray affected crop were used as seed they did not perform any better than the tubers that showed obvious signs of herbicide damage. These results clearly indicate the potential risks associated with late season exposure of seed potato crops to glyphosate drift. As the crop has largely stopped

growing and may even have started to die back by this point in the season, glyphosate exposure can occur without producing any visible symptoms on the plants or the tubers. As the plants are moving food reserves from the leaves into the tubers at this time, the glyphosate is carried along with this stream and is therefore concentrated in the tubers. These glyphosate residues have the potential to persist in the tubers over many months of cold storage. If the affected tubers are then used as seed, emergence, vigor and yield potential can all be severely compromised. Seed growers who suspect that their crop may have been exposed to glyphosate are urged to have the foliage and tubers tested for glyphosate residues and then should have the performance of their seed crop tested prior to sale – either in greenhouse trials or as part of the southern grow out trials used to assess disease levels.

Sources : **Hatterman-Valenti and Auwater (2009). HortScience 44 p.1076.**

Hutchinson, Felix and Boydston (2014). Amer. J. Potato Res. 91 p.394.