# Minimum tillage practices may raise soil acidity



LANCASTER – No-till and minimum tillage practices have introduced a major soil acidity problem not encountered under conventional tillage; the creation of an "acid roof". The concentration of acidity is in the top one to three inches of soil, Dr. W. Wayne Hinish, Penn State Extension agronomist, reported here earlier this month at the sixth annual No-Till Conference.

This, he says, is the result of the acidifying effect of nitrogen fertilizers. Nitrogen when applied to the soil in the ammonium or organic form is changed to the nitrate form by bacterial action. During this process, hydrogen ions, which are acidity, are released. Under conventional tillage systems this acidity is mixed throughout the soil. This reaction has been known for many years, and it has been common to recommend about 5 pounds of limestone for each pound of nitrogen applied just to neutralize the acidity created by the nitrogen.

The high build-up of P and K in the surface area is not all bad. Under no-till and minimum tillage there is a greater concentration of roots near the surface than under conventional tillage. This is undoubtedly due to the better moisture condition near the surface," Dr. Hinish adds.

However, some adverse conditions may result of the build-up of P and K near the surface. There are indications that high P levels can inhibit the uptake of zinc; high K levels can inhibit the uptake of Mg. What other interrelationships may occur are yet to be uncovered.

Results of two studies at Penn State clearly indicate that despite differences in yearly, absolute levels of water, soil and herbicide losses which are controlled by the amount, frequency and intensity or rainfall each year, the no-till systems are tremendously effective in reducing external drainage and downslope movement of applied herbicides, reports Dr. Jon K. Hall, Penn State agronomist.

From the standpoint of yield, the use of birdsfoot trefoil as a "living mulch" for NT-corn looks promising since it is less competitive than crownvetch on a comparative treatment basis. Moreover, singular applications of a residual triazine herbicide, such as cyanazine, are more effective in suppressing its initial growth than that of crownvetch.

"In this same context, it would seem logical that using a spray mixture containing more than one s-triazine herbicide, which vary widely in their solubility, soil persistence and leaf absorption potential, would provide the optimum conditions sought with the "living mulch," he notes.

Future work should be designed to examine in total the herbicide combinations and rates, the optimum soil fertility conditions for the cover and crop and the soil and crop management practices consistent with achieving these ideal conditions, Dr. Hall emphasizes.

Reasons for the acceptance of the no-till method of establishing forage seedings were outlined by Melvin A. Brown, Centre County Extension agent. These include:

–Reduced soil erosion on sloping land.

–Reduced labor required – less trips across the field and less stones to pick.

–Energy conservation – both in the form of reduced fuel consumption on the farm and (in the case of the introduction of legumes) less nitrogen fertilizers used.

–Increased quantity and improved quality of forages realized due to the introduction of legumes.

–Easier for part-time or small farmers to make forage seedings without owning a large inventory of equipment. In Centre County this type of farmer can hire custom operators to do all of the various jobs involved.

–The gradual development and increased availability of specialized seeding equipment.

–The effect of the rapid acceptance of no-till corn production in the county – the concept of no-till corn and forage production is similar.

This method also presents several disadvantages, he points out. These are:

(Turn to Page 116)