2002 Season Offers Learning Opportunities with Soybean Aphids

by Doug Holen

With the 2002 growing season at an end, it’s always interesting to reflect on the climate and production factors contributing to yield for the year. Most areas in the region experienced delayed planting due to the extended cold and wet spring and later went through extended periods of dry and heat. The last obstacle was the removal of crops during a challenging harvest time with uncooperative weather and slow crop maturation. Scouting throughout the season revealed several pest problems including alfalfa weevil, European corn borers, and grasshoppers, white mold, root rot, and leaf diseases, pigweeds, kochia, and Canada thistle. Research efforts focused on soybean aphids (SBA) as the Fergus Falls area realized economic thresholds midway through the season.

The outbreak offered the unique opportunity to concentrate research efforts on a new pest. The first thing learned was the SBA’s ability to overwinter in WC MN. Many aphid species, that are pests on crops in Minnesota, are not able to survive our cold winters, this insect survived the winter in locations across the state. Several buckthorn species have been identified as suitable hosts for overwintering, which means SBA won’t have any trouble finding a place to spend the winter in Minnesota. Scouting can be done efficiently with this knowledge by beginning at field margins closest to wooded areas or wind obstructions such as buildings which tend to encourage landing of SBAs in flight. Areas with significant SBA populations tended to be in close proximity to metropolitan areas (towns) and wooded acreage.

The outbreak in 2002 was different from observations made in 2001 when SBA caused widespread damage to southern Minnesota soybeans. In 2001, soybean aphids tended to build to high populations and then developed a winged generation that migrated to other areas. In 2002, aphid populations sustained large populations (500-4000/ plant) for 30 to 40 days, with no migration generation produced. Aphid colonies on plants did not stay in the same location on the plant through the growing season. Initial populations were located primarily on the top trifoliate leaves, and as the population increased, later in the season, were located throughout the plant, including leaves (up and down plant), stems, and/or pods.

University of Minnesota research plots were initiated and monitored throughout the season west and east of Fergus Falls at producer sites identified with heavy SBA infestations. SBA counts were collected prior to insecticide application and populations were monitored post treatment. Data collected included insecticide evaluations for immediate and residual control, and yield and quality consequences to soybean plants. Significant differences in yield, seeds/lb., and oil content were found at both sites. Specific insecticides provided better initial and residual control when compared to each other and the untreated checks. Air and ground application methods were found to be equally effective but could differ depending on the choice of insecticide. Both sites resulted in approximately ten bushel yield decreases in the non treated plots. Much of the yield loss can be accounted for by reduced seed size, but surprisingly, this was not detectable by measuring test weight differences. Additional testing will be done in 2003 to evaluate application timing to quantify SBA number and plant stage interactions as well as variety susceptibility differences.

Will Subsoiling Increase Crop Yields in Minnesota?

by Jodi DeJong-Hughes

Every so often there is interest about subsoiling that is initiated by a favorable report from some locality. But can that local report be applied to our Minnesota glacial till soils?

Subsoiling is a very aggressive tillage operation that breaks up the soil usually to a depth of 12-18 inches. The theory behind subsoiling is to shatter a compacted layer deep in the soil to allow increased water movement, better aeration, and access to additional nutrients for plant growth.

Heavy equipment and tillage implements can damage the soil structure. Soil structure is important because it determines the ability of a soil to hold and conduct water, nutrients, and air necessary for plant growth and is the number one defense against soil compaction.

There has been a great deal of research conducted on deep plowing with the goal of alleviating subsoil compaction. The results are mixed. However, a majority of research conducted in the Midwest, has reported no change or a decrease in yield due to the effects of subsoiling. As early as the 1950’s, Midwest researchers were seeing no effect or negative effects from subsoiling. Later, research in Iowa reported no meaningful changes in corn production. They found that subsoiling at a depth of 24 inches decreased the corn yield by 9.7 bushels the first year and 6.4 bushels per acre the following year.

There has been extensive soil compaction research conducted in Southern Minnesota by Ward Voorhees of the USDA/ARS Soils Laboratory. Results of a Waseca study reported that subsoiling to a depth of 16 inches failed to increase yields for neither corn or soybeans and actually decreased corn yield by 11 bushels per acre in one of the two years.

One reason why subsoiling fails to increase crop yield, may be due to unfavorable soil moisture conditions at the time of subsoiling. If the soil is wet, subsoiling will be ineffective. To achieve effective subsoiling the operator must be certain the soil is fracturing to the depth of the shank. If the shank is reaching a depth of 18 inches it is very difficult to determine if the soil is shattering at that depth.

Another reason for the failure of subsoiling to increase crop yield is that subsequent wheel traffic can re-compact the loosened soil. Loosened subsoil has very little bearing capacity, meaning it can’t support much weight. Johnson and Voorhees discovered that an ordinary 2-wheel drive tractor, that weighed less than 5 ton an axle, was sufficiently heavy enough to re-compact the loosened soil down to a depth of 16 inches. For that reason, controlled traffic becomes an important management tool.