Alfalfa

(Continued from Page 111)

Testing for spotted alfalfa aphid resistance has been under way at Waterman-Loomis since 1960 and, at present, all W-L varieties exhibit resistance to this insect.

The blue alfalfa aphid (**Acyrthosiphon Kondoi** (Shinji)) was first found in the Imperial Valley of California in 1975. Since that time, it has spread throughout the western United States in all states west of the Rockies. Identification of this insect has also been made in Oklahoma, Kansas, Iowa, and Nebraska but as of yet has not been a problem in the midwestern U.S. A. kondoi prefers feeding on young succulent plant parts more so than older stems and leaves. The aphid colonies cluster on the terminal growth and congregate on the tender shoots beneath the older leaves. Nymphs and adults feed on plant juices and while feeding inject or transmit a toxin into the plant which causes stunting. The stunted plants take on a grayish-green color and have deformed or curled leaves. Infestations occur in the fall and spring. Research for this insect started at W.L in 1975.

The pea aphid (**Acyrthosiphon pisum** (Harris) was probably introduced from Europe to the U.S. in the late 1800's It was first identified as a pest on peas in 1899 and then in 1921 an outbreak of pea aphid on alfalfa in Kansas and neighboring states caused severe damage The pea aphid spread over the entire United States. Nymphs and adults feeding on alfalfa plants cause the plants to turn pale yellow, wilt and sometimes die. Testing for pea aphid resistance started in 1966 in greenhouse and field tests and continued testing and field selections have led to resistant varieties.

Major diseases to consider in selecting a variety are bacterial wilt, Phytophthora root rot, southern anthracnose and Fusarium wilt and root rot.

Bacterial wilt (**Corynecbacterium insidiosum** (McCull) H.L. Jens) was first described in 1926. It causes stunting and yellowing of the entire plant. The leaves are small, chlorotic and often cupped. During warm or dry weather, the plant wilts and dies. Waterman-Loomis has been working on and releasing resistant varieties since the mid 1960's.

Phytophthora root rot (**Phytophthora megasperma** (Drechs.)) occurs on poorly drained soil, in low areas or areas with soil conditions that cause a high water table and also during periods of excessive rainfall. The fungus attacks seedlings as well as older plants and causes rotting of the root from the base toward the crown of the plant. This disease is spread across the U.S. and W-L has been developing resistant and tolerant varieties since the late 1960's.

Southern anthracnose (**colletotrichum trifolii** (Bain)) was recognized as a problem of alfalfa in the 1950's and is considered to be the principle cause of "summer decline" of alfalfa in the eastern United States Symptoms are large sunken lesions on the stems near the soil level This disease may also move into the crown area causing a charcoal black discoloration moving downward in the root from the crown There has been continuing research at W-L for this disease since 1969.

Fusarium wilt and Fusarium root rot (**Fusarium spp.**) has not been considered a major disease of alfalfa but is gaining in importance as a factor associated with stand longevity. Symptoms of this disease are stems on one side of the crown wilting and dying. Brown to red streaks occur in the woody cylinder of the root The fungus lives in the soil and enters the small roots or injuries in the root.

Wide distribution of insects and diseases in alfalfa growing areas emphasize the importance of selecting area adapted varieties with multiple pest resistance. Once the proper variety has been chosen, then attention should be shifted to the type of cultural practices that will optimize yield and stand longevity.

Alfalfa needs prime land; clean and free of weeds and with fertile, well-drained soil. Soils in the United States do not always meet these requirements, which creates the necessity of adjusting soil conditions to meet the crop's needs.

Soil fertility is determined by soil probe and-or shovel will help identify the soil morphology and any restricting soil layers. Chemical tests are used in determing soil pH, nutrient levels and electro-conductivity as well as other problems. Reputable soil labs will be aware of localized problems which occur in their areas and also test the samples for these items.

Soil reaction (pH) is important in the maintenance of healthy alfalfa. Alfalfa requires a neutral to slightly alkaline soil pH. Soils with a pH of 7.0 or less are considered acid and those greater than 7.0 are alkaline or basic. Generally, acid soils are deficient in the amounts of available calcium and phosphorus and may have excess iron or aluminum and possible other metalic ions. The addition of lime will raise the soil pH and tend to counteract some deficiencies or toxicities. In the case of basic soils, sulfur or phosphoric acid may be used to lower soil pH to acceptable levels. Gypsum may be used to supply the alfalfa plants with calcium and sulfur but will not change the soil pH.

Due to alfalfa's capacity to absorb and utilize soil nutrients, special attention to fertility levels are essential One ton of alfalfa hay requires in excess of 40 pounds of nitrogen and potassium 10 to 12 pounds of phosphates, nearly 30 pounds of calcium and 5 pounds each of sulfur and magnesium. In areas with longer growing seasons, the use of split applications has been beneficial for more uniform plant growth throughout the growing season. In a split application of fertilizer, ½ of the amount of fertilizer is applied after the first harvest and a second application is made at the middle of the harvest season.

Once the macro and micro nutrients and soil reaction have been dealt with, soil and seed bed preparation begin. The soil should be deep and well-drained to promote good root growth. To insure this, subsoiling, chiseling and other deep tillage practices are used. Soil cultivation also helps incorporate any soil amendments and nutrients that were added to the soil. Maximum tillage with minimum wheel traffic over the field will be of greatest benefit to the crop. The seed bed should be free of clods and firm to insure good seed to soil contact after planting. Once the soil is prepared for planting, soil moisture should be taken into consideration. Pre-irrigation is often used to provide adequate moisture for the germination and establishment of an alfalfa stand. Planting on moist soil is best, but irrigation or rainfall is often used after the crop is planted. The latter is not recommended as often because it is difficult to put on large enough quantities of water after the seed has been planted and crusting of soil surface also occurs which inhibits the seed's emergence.

In irrigated areas of the western United States, an irrigation schedule and a harvesting schedule should be established. Alfalfa requires 6 to 7 inches of water to produce one ton of air dry hay. The frequency of irrigation is dependent on the soil and climatic conditions of the area. One, but not more than two irrigations should be applied between harvest. Too frequent watering will establish disease conditions that would be unfavorable for the crop. The field should be dry enough at harvest time to prevent soil compaction from harvesting equipment. This is generally accomplished if the final irrigation is applied seven to 10 days before harvest.

The harvesting schedule is crucial in the production of healthy hay. Alfalfa top growth is initiated at the expense of the root food reserves As the top growth matures, excess photosynthates and metabolites are trans-located to the roots to replenish and re-establish root reserves that were utilized for forage production. A short harvesting schedule does not allow for enough time for the plant to restore root reserves. Continued harvesting on a shortened schedule will eventually deplete the root reserves and kill the plants.

Extended length in schedules means lost harvests and possible reduction of yield and quality. To determine the proper cutting dates, it is necessary to utilize maturity signs from the plants. Alfalfa is normally harvested at late bud stage to 1-10 bloom or when 50 to 60 per cent of the crown buds are less than ½ inch tall. The latter method is preferred since it is possible that bloom will not occur in the field because of drouth stripping or insect damage which would remove the presence of any flower buds. With correctly spaced and timed harvest, more cuttings and higher yields may be realized.

To conclude, it should be emphasized that a productive, high yielding alfalfa field requires superior alfalfa varieties and diligent application of correct management practices.