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Lupin, a Potential New Crop for Alabama

The southern region of the United States is fortunate to have a climate that allows two cropping seasons per year. However, the choice of winter crops is rather limited at present. Wheat has been the traditional winter crop choice, but acreage of wheat grown for grain has decreased during the past decade because of increasing production costs and declining grain prices. One crop with a potential to fill this void is sweet white lupin, a winter-grown annual legume.

Sweet white lupin is naturally adapted to well-drained, low-fertility, coarse-textured, neutral to acidic soils, such as those in the southern Coastal Plain of the United States. Because it is a nitrogen (N) fixing legume, it does not require nitrogen fertilizer. Development of cropping systems utilizing winter-grown lupin would: (1) provide a rotation yield response to subsequent summer crops; (2) reduce or eliminate N fertilizer requirements; and (3) produce high protein feed grain or high quality silage. A cropping system involving sweet white lupin as a component would fit particularly well into a diversified crop/livestock system.

Lupin also offers other advantages. As a cover crop it would reduce erosion, improve soil tilth, and reduce the danger of ground and surface water pollution. It would have all the advantages of current legume cover crop systems in conserving soil and water resources, but could be more profitable than current systems due to the value of grain or silage produced. Sweet white lupin seed does not contain trypsin inhibitors or other antinutritive factors that require heat processing, such as soybeans. Lupin seed therefore can be used without special precautions and the crop does not require that a marketing or trading system be in place.

An AAES research project to evaluate lupin as a potential crop for Alabama was initiated in 1991. The project is a collaborative interdisciplinary research and extension effort and is funded in part by the Wheat and Feed Grain Committee of the Alabama Farmers Federation.

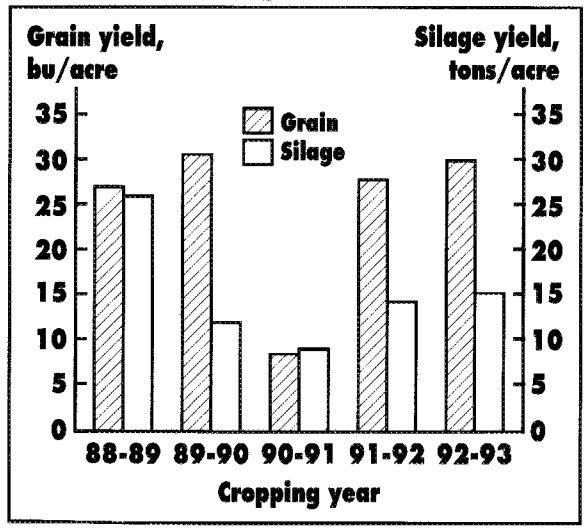
One of the requirements for commercialization of a new crop is that it can be grown reliably. Thus, research focused on basic agronomic practices, such as planting method, seed treatments, planting date, and seeding rate. Furthermore, most leguminous crops such as lupin become weak and are susceptible to soil-borne disease organisms if exposed to water-saturated soils. Therefore, other work has focused on planting lupin on raised beds, which is the most effective method of reducing attack by soil-borne disease organisms and improving stand percentage.

White lupin is a cold-hardy species that tolerates low temperatures during the vegetative stage. In December 1989, Tifwhite-78 white lupin in AAES plots was subjected to five consecutive days of freezing (temperatures), during which temperatures did not exceed 28°F and daily lows were 12, 8, 3, 3, and 24°F. Some plants were killed during this period, but damage was minimal in elevated and well-drained sites. However, lupin is cold-sensitive during flowering and seed set. The late-winter snow storm on March 13, 1993, severely damaged the French variety Lunoble that was flowering at the Plant Breeding Unit, Tallassee, but no harm was done to the same variety at the Tennessee Valley Substation, Belle Mina, because it was still vegetative.

These findings suggest that planting dates need to be adjusted to match varieties to local environmental conditions. Maximum grain yields have been obtained when lupin was planted in late-September in northern Alabama and late-October in southern Alabama. In 1988-1993 trials, average grain yields ranged from nine to 30 bushels per acre (see figure), with top yields exceeding 60 bushels per acre. The low yield during the 1990/91 cropping season was caused by severe disease brought on by excessive rainfalls during pod set in April and May 1991. Silage yields at 65% moisture during the same years ranged from nine to 26 tons of dry matter per acre.

Is there a future for lupin in Alabama's agriculture? Based on research conducted during the last five years, there definitely is. But don't look for thousands of acres of flowering lupins within the next three years. Developing a new crop is a long, arduous process. Many details need to be addressed before the crop can be grown commercially.

One important aspect is determination of the value of the resulting grain or silage in animal diets, including cattle, hogs, poultry, and fish. Studies to determine this have begun but will take three to four years to complete. Another need is the development of varieties that are better adapted to climatic conditions in Alabama. Promising parental lines have been obtained from collaborators abroad with which varietal development has started, but it will take five to seven years before a new variety can be released.



Average white lupin grain and silage (at 65% moisture) yields from trials conducted from 1988-1993.

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