11. Chemical-free Burley Tobacco

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Producers are now growing chemical-free tobacco in both the burley and flue-cured regions of North Carolina. Production methods have to be altered to take into account the lack of some pesticides and fertilizer materials allowable in traditional tobacco production. The following production guidelines should be useful for the production of chemical-free tobacco. Tobacco company requirements may differ depending on the type of tobacco requested for their use.

Variety Selection

Only varieties that have disease resistance should be used (see Chapter 9). Burley variety NC 2000 has moderate blue mold resistance and has worked well in past chemical-free burley research experiments.

Transplant Production

This phase of production may be the most difficult. Fertilizer materials and pesticides commonly used in the transplant float system are restricted, and alternative materials that may work in the field (decomposing manures and organic fertilizer sources) are not necessarily suitable for the float system. Cool weather also limits nutrient availability in outside plant beds because cool soils will slow decomposition of these fertilizer materials. Outbreaks of insects and diseases will be difficult to control in greenhouse float beds and outside plant beds. For more information on this subject, see Chapter 4.

Field Preparation

Two important considerations for tobacco production will be the use of a legume or grass cover crop planted the winter before tobacco production and, if available, the use of manure and compost.

Cover Crops

Cover crops will improve soil quality and provide plant nutrients when the cover decomposes. Plowing small grain cover crops in late March or early April will allow the vegetation to decompose midway through the burley growing season and provide around 40 pounds nitrogen (N) and potassium (K) per acre and 5 pounds phosphorous (P) per acre. Late spring plowing will provide more uptake of small grain plant nutrients; however, decomposition will be more difficult due to the inability of microbes to quickly decompose this mature vegetation.

Legumes will have little growth early in the spring, so plowing for this winter cover material should be delayed for maximum nutrient accruement. Legumes can fix nitrogen by removing N_2 from the air, transforming it to ammonia in the plant, and by eventually converting it to plant protein. Once plowed under, legumes should immediately begin decomposing and provide plant-available nitrogen, phosphorus, and potassium (75, 15, and 80 pounds per acre, respectively, for late spring plowing). For more discussion on cover crops, see Chapter 6.

Manures

Manures, too, should be considered as replacements for synthetic chemical fertilizers. Both spring and fall manure application will benefit tobacco and can replace some or most of the fertilizer requirements. Applying animal manure in the fall rather than in the spring will allow more plant nutrients to be available during the tobacco growing season. Having a chemical analysis performed on the manure will provide information on the amount of available and total nutrients in the manure and tell how much additional manure to apply. Additional information can be found on the Web at these addresses: **http://www.ncagr.com/agronomi/sfn12.htm** and **http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-18/**

Fertilizer Application

Burley tobacco requires 180 to 200 pounds N per acre for a crop of 2,500 pounds per acre. Most synthetic fertilizer materials contain plant nutrients that are available when applied to the soil. This makes for easy application of fertilizer, and growers can time application with plant uptake. Two fertilizer materials that may be allowable

include bulldog soda (16-0-0) and potassium magnesium sulfate (0-0-22). Using fertilizer materials that are organically based (that is, the materials need to decompose for plant nutrients to become available) requires some decomposition by microbial activity. Although some plant nutrients may be immediately available, most nutrients must undergo a process called mineralization to become soluble in the soil and eventually available for plant uptake. Mineralization by microbial activity requires oxygen and water to proceed. Although most soils contain sufficient water for microbial activity, having irrigation available (either overhead or trickle) will optimize organic material decomposition by soil microbes.

Past experiments at the Upper Mountain Research Station using various sources of organic fertilizer materials showed first that it was very important in a dry summer to have irrigation for the tobacco. The location of our experiment was an upland site, and with 28 days of no rain late in the growing season, tobacco was considerably taller and produced higher yields in the irrigated treatment compared to the non-irrigated treatment. The following year at the Mountain Research Station we had continuous rain during the summer, and no irrigation was necessary.

Organic Sources of Available Fertilizer

Organic sources of available fertilizer include soybean meal, cottonseed meal, composted chicken litter, composted chicken processing waste (meat/bone meal at 9-3.5-1), and other bagged materials sold at local farm suppliers. Bagged materials will have the amount of available nutrients confirmed by laboratory analysis. Soybean and cottonseed meal analyses give measurements close to 7 percent N, 1.2 percent P_2O_5, 1.5 percent K_2O for soybean meal; and 6 percent N, 3 percent P_2O_5, 1.5 percent K_2O for cottonseed meal. Composted chicken litter and processing waste have value due to the nitrogen and phosphorus in these materials. Always consider having a chemical analysis performed on the material being used as fertilizer.

Our experiments on-station have given us important information on potential tobacco yield response from these materials. Composted chicken manure gave us less tobacco yield than the other organic fertilizer materials. This was due to the large amount of bedding (a carbon source) that was mixed with the manure. This carbon addition reduced the amount of available nitrogen in the soil due to immobilization (microbial activity that uses nitrogen when decomposing carbon material). All the other materials produced

similar good tobacco yields. Two factors should decide a grower's decision on choosing a fertilizer source: first, the availability of the materials desired; and second, the cost of the material. Soybean meal currently is selling for $14.60 per 100 pounds. The cost for fertilizing with this material at 200 pounds N per acre would be $415 per acre. This compares with 16-0-0 (bulldog soda at $14.00 per 100 pounds) at $175 per acre. Although there are small amounts of P, K, and other micro nutrients in the soybean meal (and carbon as organic matter), the cost is much greater for this material. Organic materials do decompose slowly, providing more fertilizer nutrients late in the season when tobacco is growing rapidly.

Weed Control

Mechanical cultivation will be required between tobacco rows, and hand cultivation will be required between plants.

Pesticide Use

Very few pesticides are available for chemical-free production. Disease resistance will have to play a major role in chemical-free burley tobacco production; however, a few topical materials are available for surface control of plant diseases. The company purchasing your leaf may limit the use of topical materials, so be sure to check with the company. Insecticides, too, will be limited, but *Bacillus thuringiensis* can be used for control of budworms, hornworms, and loopers.

Sucker control was achieved with the use of vegetable oil. In our on-station experiments, about ¼ cup of corn oil was applied on each normal-sized plant. This amount however was too much for small plants, girdling the plant at the base (soil interface). In addition, some leaf drop occurred after application of the oil and before harvest on these small plants.

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