Longleaf Leaflet
LL-#9
March 2011
North Carolina Forest Service

MANAGING PINE STRAW PRODUCTION IN NORTH CAROLINA

The importance of pine straw as a forest product is due to its popularity as a mulch in the landscape and horticultural industry. Retail sales of North Carolina longleaf pine straw in 1996 were estimated to exceed $25 million. As the market expands farther north, volumes have the potential to double or triple that amount. Longleaf pine straw is favored over other pine straw because of its attractive reddish color, longer needles, ability to stay in place and slower decomposition rate.

Marketing: Pine straw is bought and sold on either a per bale, a per acre or even a per cubic foot basis. Producers who rake and bale straw typically sell their product on a per bale basis while woodland owners sell their straw on a per acre basis, generally to other producers. Lump sum sales by either method, however, require an accurate estimate of straw yield. Some producers set up buying stations and purchase loose straw. Payment is made based on number of bales produced.

Yields: To compound the problem of estimating yields, the size and weight of bales vary. Bales may be 28-to-36 inches long and weigh from 30-to-60 pounds on a dry basis. An average weight would be 40-to-45 pounds for a well packed bale. Much like bale size and weight, the yield of straw varies from stand to stand, but is generally related to tree density and site quality. For example, a dry site having a low site quality will yield less straw than a moist site having a high site quality so that a low annual yield of 50 bales per acre to an above average yield of 100 bales per acre is possible. An average would be about 70 bales. Most straw is harvested from stands that are at least 15 years old and have reached crown closure.

Managing Competition: To maximize the harvestable area of a stands, to increase the efficiency of the baling operation and to achieve the best market price for straw, production areas should be accessible and free of competing vegetation, particularly hardwood brush. Bales of straw that are contaminated with limbs, pine cones and oak leaves are less desirable than clean bales. Because brushy stands are difficult or impossible to work, the use of herbicides in conjunction with cutting of brush may be necessary to “clean up” production areas. Prescribed fire may also be used to control understory vegetation to facilitate the baling operation. Maintaining a basal area of about 90 square ft. per acre is important in controlling understory vegetation as well as maximizing straw yields. This basal area is equivalent to 165 ten-inch trees/acre about 16 feet apart (more small trees growing close together or fewer large trees growing further apart). Thinning out corridors wide enough for tractors, equipment and transport vehicles will generally be necessary. Areas outside these corridors may be selectively thinned.

Once an area has been thinned and cleaned up for production, raking and baling can begin. Removal of straw from stands is preferably done every two years since annual raking rarely allows enough needles to accumulate to maximize production in terms of baling time. Furthermore, annual raking may increase soil compaction on some soils and may completely eliminate the litter layer. Such action creates opportunity for erosion, drought stress and lowers the productivity of the site for production of both wood and straw.

Fertilization: Raking straw will remove nutrients from forest stands. How much is removed depends upon the amount of straw removed and the frequency with which it is removed. Some soils and sites will support more raking than others before a decline in productivity of wood and straw is experienced. In general, however, fertilization to replace nutrients and increase straw production is desirable from an investment standpoint. Dry sites of low index are an exception to this rule since moisture availability is the primary factor limiting productivity.

This publication was made possible through funding from the American Recovery and Reinvestment Act.

To ensure that fertilization is warranted, sampling of foliage from terminal branches from the upper 1/3 of the crown should be done every five or six years. A minimum of five trees for every 10 acres should be sampled.[2] Analysis should be done by a plant tissue lab such as the NCDA, Agronomics Division, Raleigh, NC and the results evaluated by competent agronomists. The phone number for the NCDA is (919) 733-2656.

Tentative Nutrient Sufficiency Level for Dormant Longleaf Pine Foliage				
N	**P**	**K**	**Ca**	**Mg**
Percent Concentration				
0.95	0.08	0.30	0.10	0.06
*Values are expressed as decimal fractions of 1% of sample dry weight.				

The maximum recommended single-application fertilization rate for longleaf pine is 100 pounds of N per acre, 60 pounds of P_2O_5 per acre, 60 pounds of K_2O per acre, 100 pounds Ca per acre, and 25 pounds Mg per acre. These rates are adequate to replace nutrients removed over approximately 10 years of unfertilized pine straw raking. These rates should be applied on a six to eight year interval, if raked on a yearly basis (stands raked less frequently could be fertilized on a longer cycle).

Fertilizer Sources	
N	Urea or ammonium nitrate
P	Soluble superphosphates, ammonium phosphates, or soluble rock phosphates
K	Muriate of potash
Ca	Gypsum
Mg	Epsom salts

Make fertilizer applications in early spring to maximize plant uptake. Avoid direct application to open water to reduce the risk of nitrate or phosphate water-quality problems. Sites should not be burned for six months prior to fertilization to avoid applying urea to an ash layer that may increase ammonia volatilization. Fertilized stands should not be burned following treatment to avoid loss of pine straw and tree growth due to crown scorch.

Responsible Raking: Even though nutrients can be replaced in straw stands, raking and the use of herbicides can be destructive to the diversity of plant species that exist in many longleaf pine communities. It is often desirable to identify unique areas and eliminate them from straw production. These areas typically need periodic burning to maintain the varied herbaceous plants and grasses that occur naturally in a longleaf ecosystem.

While straw production may pose problems in preservation of natural areas, it is a good incentive for restoration of longleaf stands on agriculture sites. Old fields offer opportunity for establishment of plantations for straw as well as timber production. Through time, even these planted stands may be managed in a fashion that will allow some restoration of unique plant communities on former agriculture fields.

Producers Association: The North Carolina Pine Needle Producer's Association, a non-profit organization dedicated to conservation and research for the production of quality pine needles may provide additional information to interested parties. This organization may be contacted at P.O. Box 2326, Southern Pines, N.C. 28387 or www.ncpineneedleproducers.com.

Additional Reading:

Hamilton, Rick and Mark Megalos. 1997. Woodland Owner Notes: Producing Longleaf Pine Straw. North Carolina Cooperative Extension Service, North Carolina State University.

Blevins, D., H.L. Allen, Steve Colbert, and W.E. Gardner. 1994. Nutrition Management for Longleaf Pinestraw. North Carolina Cooperative Extension Service, North Carolina State University.

Schafale, M.P. and Alan S. Weakley. 1990. Ecological Concerns About Pine Straw Raking in Southeastern Longleaf Pine Ecosystem. NC Natural Heritage Program. NC Division of Parks and Recreation.

Disclaimer: Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical.

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