More than 6 million acres of Alabama forestland are growing low-value, poor-quality hardwoods when they could be growing valuable pine timber. Why? Because the valuable pines were harvested, the poor-quality hardwoods were left, and the task of forest regeneration (producing a new stand of timber) was left to mother nature. Unfortunately, nature’s way encourages the upland hardwoods, which have a very low market value, and discourages the valuable pines.

Many forest landowners are losing thousands of dollars each year because they failed to regenerate their pine stands after harvest. As a result, these stands are producing only a fraction of their potential growth and income. But, this does not have to continue. With adequate site preparation, southern pine stands can be regenerated by natural means (using seed from mature trees about to be harvested) or artificial means (planting seedlings or direct seeding).

The Need for Site Preparation

Southern pine trees will not tolerate shade and grow most rapidly in full sunlight. Therefore, conditions of high sunlight and little or no shade are best for stand establishment. Unfortunately, a typical logging operation in a pine stand usually leaves an abundance of poor-quality, undesirable hardwood trees. These trees shade the forest floor and make it difficult for pine seedlings to grow. The timber type changes from the higher value pines to lower value hardwoods. If these pine sites are to grow pine timber again, the competition from hardwoods and other broadleaved shrubs and weeds must be greatly reduced.

Thus, site preparation is needed. The major objectives of site preparation are to reduce the competition from unwanted vegetation for sunlight, moisture, and nutrients and to make tree planting easier.

Site Preparation Methods

Methods of site preparation fall into three general categories: prescribed burning, chemical, and mechanical. Costs range from as little as $10 to $20 per acre for prescribed burning to more than $200 per acre for some mechanical treatments. Each method can be used alone or in combination with other methods to improve the overall effectiveness of site preparation.

Prescribed Burning

Prescribed burning is the oldest and least expensive method of site preparation. It is particularly useful in regenerating pines by natural means such as the seedtree and shelterwood systems. For natural regeneration, a tract may need burning several times over a period of years to control hardwood competition. Then, when a good seed crop is anticipated, the tract should be burned just prior to seed fall to prepare the seedbed and expose the bare mineral soil which is essential for seed germination.

On clearcut or cutover sites where brush and residual hardwoods are abundant, prescribed burning by itself is not a dependable method of competition control or debris reduction. Hardwoods larger than 3 inches in diameter are difficult to kill, and even after top killing, may resprout vigorously. However, prescribed burning can be a valuable supplement to many chemical and mechanical treatments.

Caution: Fire can be dangerous and highly destructive when used incorrectly. Before burning you must obtain a burning permit from the Alabama Forestry Commission. Anyone planning to use fire for site preparation should seek expert advice and assistance. For more information, see Alabama Cooperative Extension Service Circular ANR-331, "Prescribed Burning in Alabama Forests."
Chemical Site Preparation

The use of chemical herbicides for site preparation in southern pine forests has become increasingly popular in recent years. There are several advantages to using chemical methods. Chemicals can be used to control competing hardwoods with little soil disturbance. They can be used on steeply sloping land where equipment limitations are severe. Some chemical treatments can be applied by the landowner on small acreages where mechanical methods may be impractical.

The three most commonly used methods for chemical treatment are tree injection, foliar spraying, and soil application. Most chemical treatments are done in combination with prescribed fire. Burning after a chemical treatment often enhances chemical effectiveness and helps remove debris, making tree planting easier.

Tree injection can be used to kill moderate and large size hardwoods, particularly in combination with fire, which can kill the smaller ones. Injection is also useful as a follow-up to broadcast chemical and mechanical treatments. Tree injectors are used to apply a chemical herbicide through the bark of a tree. There are two types of injectors. The basal injector is used to apply the chemical at the base of the tree; the Hypo-hatchet is used to inject the chemical about waist high. Other tools such as a hatchet and plastic squeeze bottle can be used. The hatchet can be used to frill the tree and the squeeze bottle to squirt the chemical into the frill. Tree injection is labor intensive and is most applicable on smaller tracts or where the number of stems per acre is low.

Foliar spraying of chemicals can be done from aircraft or ground equipment. This is one of the fastest and least expensive methods of hardwood control. However, this method should be used only when there is no hazard from drift. With this technique, a foliar spray is applied in early to midsummer, followed by a prescribed burn six to eight weeks later. The herbicides cause defoliation of the vegetation, providing an abundance of combustible fuel.
SOIL APPLICATION of herbicides can be done as a broadcast treatment, on an individual stem basis, or on a grid system. Soil-active chemicals are available in both liquid and granular formulations. When applied to the soil surface, these chemicals are washed into the soil by rain water and absorbed by the root systems of plants. They can be broadcast over an area from the air or from the ground in much the same manner as foliar sprays. But, they are particularly adapted to the treatment of small acreages when applied by hand with techniques such as the "spotgun" method.

**CHOPPING** is accomplished by pulling a rolling drum chopper over a site covered with hardwood brush and small diameter trees. The chopper, pulled by a crawler tractor, crushes the brush and cuts it up into small pieces. Chopping can be done in one or two passes over an area and with single or tandem choppers. The chopping operation is usually followed in several weeks by a prescribed burn. Chopping has some advantages over other mechanical techniques. It causes little soil disturbance, incorporates some organic matter into the soil, and is usually less expensive than other mechanical methods.

**Rolling drum chopper causes little soil disturbance.**

**Shearing** is done with a large V-blade or KG-blade mounted on the front of a crawler tractor. The shearing blade is used to cut off all vegetation right at the soil surface. However, the blade often drops below the soil surface and causes a great deal of site disturbance. After a shearing operation, quite a bit of mineral soil is exposed.

**Root raking** usually follows shearing. After a normal shearing operation, a blade with teeth on it, called a root rake, is used to push all the vegetation on the site into windrows. This leaves the site completely clean with bare mineral soil exposed everywhere but in the windrows. With this type of treatment, machine planting is very easy.

**Disking** may follow root raking on sites where the soil is very hard or on sandy sites where many small roots exist. Large heavy disks or disk harrows are used to break up the soil surface. This is done to facilitate planting. Following shearing, root raking, and disking, the planting site resembles an agricultural field more than a forest site.

**Bedding** is most often used in flatwoods or other poorly drained sites. A special bedding harrow is used to produce a raised bed on which seedlings may be planted. The objective is to raise the seedlings' roots above the water level. Bedding improves the drainage and makes planting easier. Since bedding requires a site relatively free of debris, it is usually preceded by shearing, root raking, and disking.

**Mechanical Site Preparation**

Mechanical site preparation includes many different methods and types of equipment. Most mechanical methods are directed toward the removal of competing vegetation and producing a site suitable for machine planting. Various mechanical techniques may be used in combination with each other and in combination with chemicals and fire. Some of the more common mechanical methods are chopping, shearing, root raking, disk ing, and bedding.**
Potential Site Damage
Prescribed burning and chemical site preparation methods have little permanent effect on site productivity. However, intensive mechanical methods have potential for seriously damaging the basic resource of forestry—the soil.

Mechanical site preparation is the primary source of soil erosion from forest management in the South. With the exception of chopping, which causes only minor soil disturbance, mechanical techniques such as shearing, root raking, disking, and bedding can be very damaging. These methods often result in the removal of organic matter, topsoil, and nutrients during windrowing and further losses from accelerated erosion.

Studies have shown that the removal of only 2 inches of topsoil into windrows during site preparation can result in the loss of more than 10 feet of 50-year site index. In other words, a site with the capacity to grow trees 80 feet tall in 50 years would be damaged to the point that it could grow trees only 70 feet tall in 50 years. Thus, the reduction in site quality will result in loss of income from future timber production.

Choosing A Site Preparation Treatment
1. Before beginning any site preparation work, know the method of pine regeneration that you will use. Sites to be naturally regenerated by reseeding from existing trees may need only a prescribed burn. Sites with dense brush to be cleared before planting may need intensive mechanical methods.

2. Before investing in site preparation, determine soil quality and moisture conditions—factors which affect the ability of the site to grow timber. Soils information can be obtained from the Soil Conservation Service. Generally, it does not pay to use expensive methods on poor quality sites.

3. The site preparation method you choose will determine the planting technique to be used. Machine planting requires a site relatively free of debris. However, you can hand plant on rough terrain or sites with moderate debris accumulations.

4. The size of the tract to be regenerated may dictate your site preparation method. It may not be feasible to move in equipment to site prepare a small tract. In such cases, fire and hand-applied chemicals may be the only treatments available.

5. When using prescribed burn for site preparation, be sure to obtain a burning permit and have on hand enough men and equipment to control the fire.

6. Be careful when using chemicals for site preparation. Liability may result if chemicals get into streams and lakes or if they drift across property lines.

7. When using mechanical site preparation methods, be sure to leave undisturbed buffer strips along streams, construct windrows on the contour, and never site prepare heavy soils during wet periods.