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Dry Face of Naval Stores Pines

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Dry face is a condition of naval stores pines in which there is a permanent cessation of gum flow from a portion or all of the normally active part of the turpentine face. Dry face has occurred as early as the third year of work on the front face, but most occurrences have been on back-faced trees. Where trees are not harvested promptly after completion of turpentining, these dry areas are frequently attacked by insects and fungi. Such attacks cause stain and decay which may extend for considerable distances above the face and thus reduce the quality of the wood. Among the two commercial naval stores pines in the United States, the condition has been more commonly found on slash pine (*Pinus elliottii* Engelm.) than on longleaf pine (*P. palustris* Mill.).

Dry face has been a cause of serious economic loss to gum farmers at times and over small areas. It has never become epidemic in the naval stores region as a whole, but can occur to a limited extent almost anywhere among pines being tapped for resin. No extensive surveys, however, have been made to determine its incidence and the magnitude of associated losses in decreased resin yield and degraded timber.

The occurrence of dry face and of associated losses have been greatly reduced in recent years by the use of improved gum extraction techniques, good management of naval stores stands before turpentining is started, and prompt harvesting of trees after completion of turpentining. Mill scale studies on trees from a typical naval stores operation have shown that under these conditions the loss in grade and volume of lumber or pulpwood attributable to turpentining was less than 1 percent. These results however were obtained on trees having an adequate supply of soil moisture during the period of turpentining.

Symptoms

The first recognizable symptom of dry face is a pitch soaking of the inner bark and wood above the turpentine face. As chipping progresses on affected trees, dry areas

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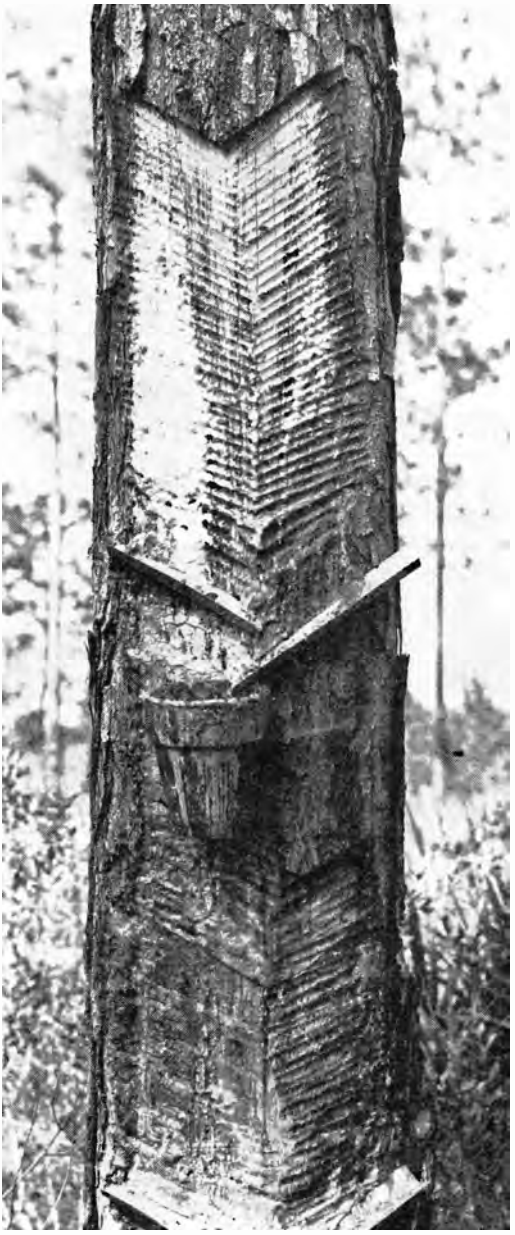

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Figure 1.—Dry face developed in this face early. The last 2 years of chipping were an expensive waste of time. Chipping technique and the cup and gutter installation used here are now obsolete.

may develop in flamelike patterns extending above the face. These dry areas do not yield gum when chipped (figs. 1 and 2). This is the symptom which gave rise to the name *dry face.*

A more severe form of dry face, called pitch streak, was observed in

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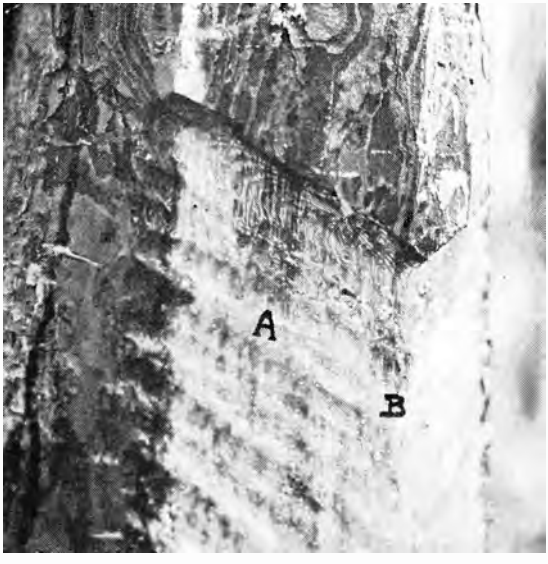
Figure 2.—This working face shows the development of dry face. The two areas of dry face extend upward from points A and B.



parts of the naval stores region after each of two prolonged periods of drought culminating in the years 1932 and 1955. Pitch-soaked areas, sometimes called cambial blisters or internal lesions, occurred above and beside the dry areas. A moderate amount of resin exuded through the bark covering these lesions. As the disorder progressed, the lesions extended over the bole both upward and circumferentially from the dry area.

Some of the most severe cases of pitch streak observed in 1955–56 were lethal. In such cases, the lesions spread over a large portion of the surface of the bole and extended into the crown. The needles turned olive brown or bronze, and death of the tree followed shortly thereafter.

Predisposing Factors

The specific cause of dry face is not known. Drought, however, is probably the most important predisposing factor, because large increases in the occurrence of dry face have coincided with dry periods. The greatest increases in dry face during these dry periods have occurred in stands of slash pine growing on pond margins. On these sites, trees are very shallow rooted and suffer more from moisture stress than do the more deeply rooted trees on sites with normally low water tables.

Severe mechanical damage associated with poor gum extraction techniques can aggravate the effect of drought on a tree and thus further increase the occurrence of dry face. Among such practices known to be detrimental are (1) making the face width greater than one-third of the circumference of the tree, (2) working two or more faces on one tree at the same time, (3) chipping deeply into the wood, and (4) using broadax incisions for insertion of gutters. Most gum pro-

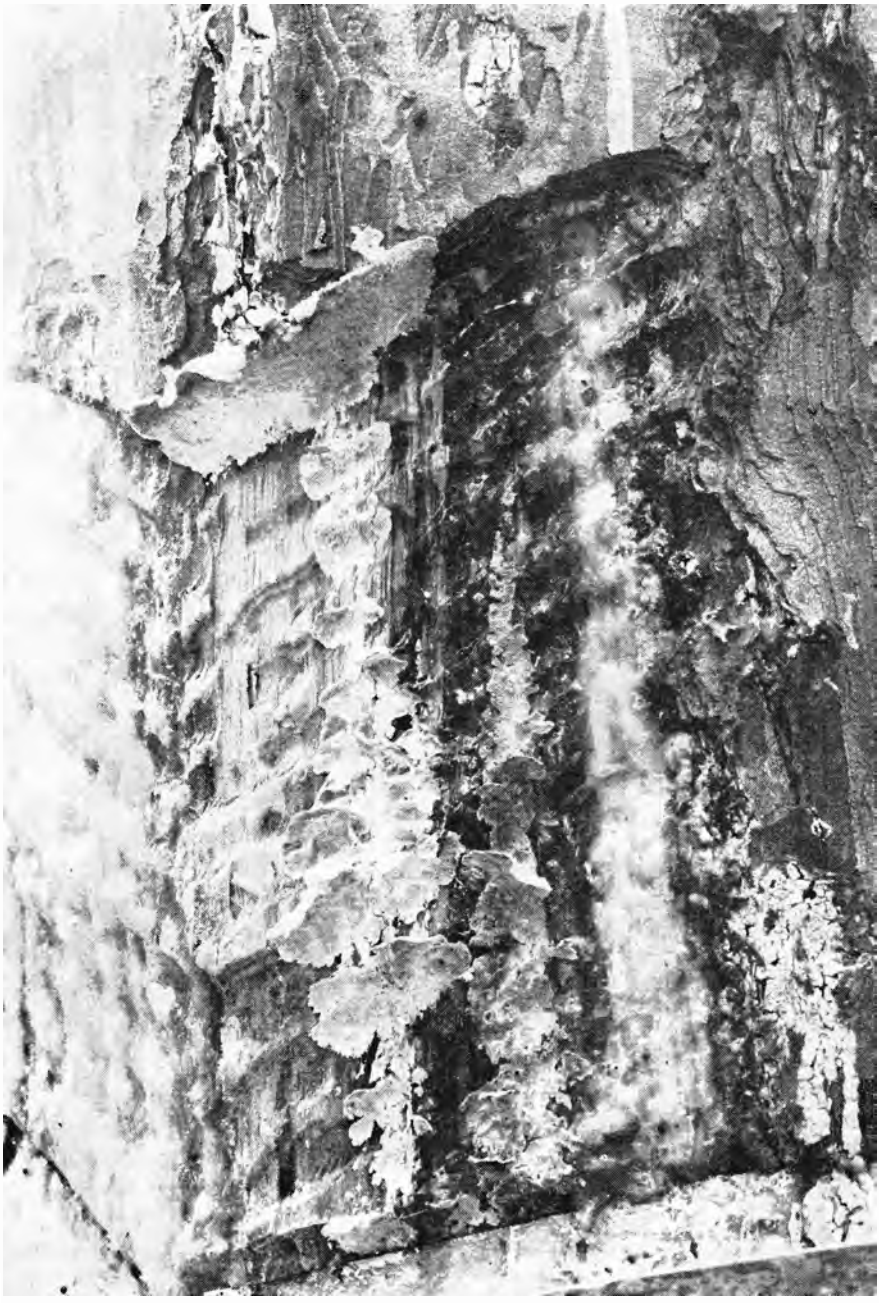


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Figure 3.—Sap-rot fungus *Polyporus abietinus* Fr. fruiting on dry portion of a turpentine face affected with dry face. When this tree was harvested, the butt portion had to be culled.

ducers, however, are now using improved extraction techniques which minimize mechanical damage to the water-conducting system of the tree and reduce the occurrence of dry face.

Crown length of trees is also strongly correlated with the occurrence of dry face. The frequency of dry facing increases with a decreasing proportion of crown length. A tree having a crown length less than one-third of total tree height is very susceptible to dry facing. Crown length can be controlled by proper thinning in the stand during the years before turpentining is started.

Associated Fungi

No fungus has yet been proved to be a primary cause of dry face. Dry face symptoms, however, have been induced experimentally during a dry season in wood-chipped slash pine trees by inoculation with isolates of *Diplodia pinea* (Desm.) Kickx, *Gloeotulasnella pinicola* (Bres.) Rogers, or *Ceratocystis ips* (Rumbold) Hunt. Similar inoculations have not been attempted on bark-chipped, acid-treated faces. The evidence indicates strongly, however, that when moisture stress occurs in turpentined trees, these fungi can accelerate and aggravate the rate of dry face extension. Where dry-faced trees have remained in the stand for several years after turpentining was completed, several species of common sap-rot fungi have entered and spread, causing a loss in timber value (fig. 3).

Prevention and Control

Measures for avoiding dry face are synonymous with good management and turpentining practices. In young, fully stocked stands, a schedule of thinning should be started well ahead of turpentining so that trees will have crown lengths greater than one-third total tree height when they reach turpentining size. In older stands, the cupping of trees having a crown length of less than one-third of tree height is a poor investment and should be avoided. Such trees usually are low in gum yield and are very susceptible to dry facing, especially during periods of drought. In many cases such trees should be harvested in an improvement cut before turpentining is started.

Two changes in gum extraction techniques during the last decade have greatly reduced the incidence of dry face. One is the change from wood chipping to bark chipping with acid treatment, and the other is the use of nailed instead of inserted gutters. Bark chipping alone has reduced the incidence of dry face by 50 percent. The newer techniques cause a minimum of damage to the water-conducting tissues of the tree during turpentining (fig. 4); the result is a more vigorous tree, with higher gum yields and less dry facing.

A limit of 3 years' naval stores work per tree before harvest is being imposed by some landowners on their naval stores lessees. This time limit is an excellent way to avoid dry face, because symptoms rarely occur during the first 3 years' work.

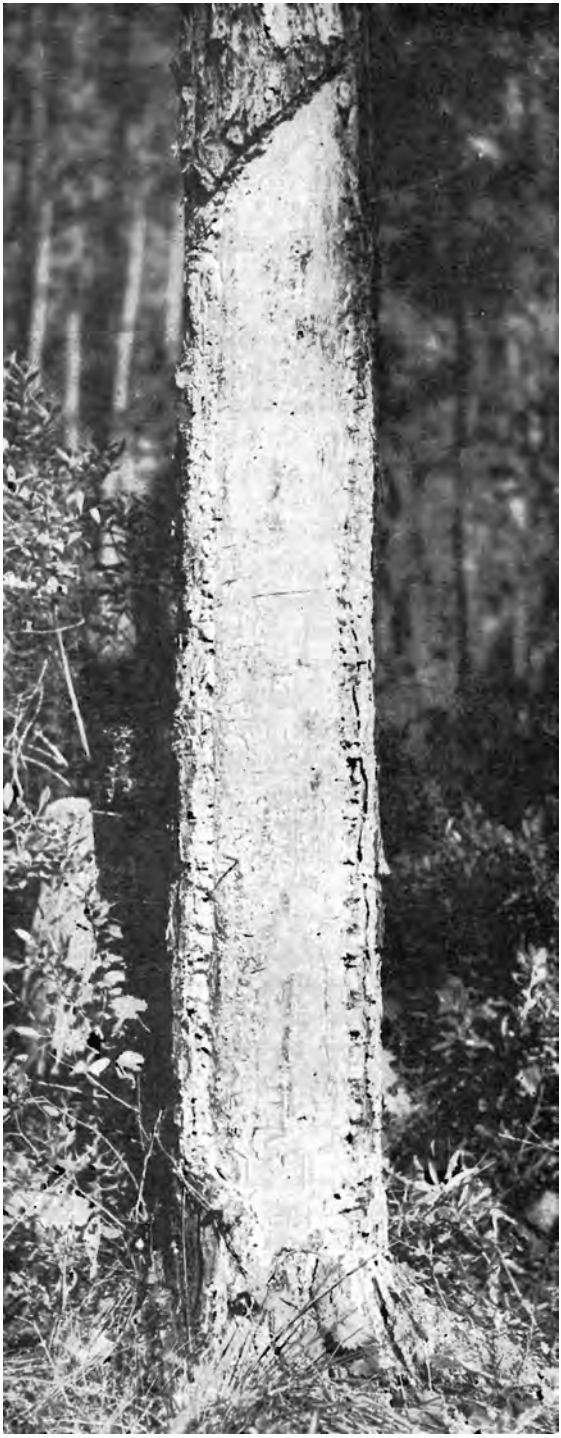

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Figure 4.—Improved turpentining practices have greatly reduced the occurrence of dry face. On this tree, 5 years of turpentining have been completed and the gutters and nails have been removed. The entire butt log is merchantable. Bark chipping and the absence of deep cuts like those in figure 1 for gutter insertions have prevented excessive damage to the water-conducting tissues.

Prompt harvesting of trees after turpentining is completed will prevent the spread of wood-rotting fungi from points of infection in dry-faced trees.

Even with the best of forest management practices, and with labor skilled in the use of the latest improved gum extraction methods, any gum producer may have at least a few dry-faced trees. When symptoms are mild and appear during a period of dry weather, there is some chance of restoring normal yields of gum from the affected trees. Under these conditions, chipping should be discontinued until the next heavy rain occurs. Then chipping may be resumed at a height of several inches above the dry portion of the face. This height may be reached by making several consecutive streaks through the dry portion or by a jump streak. On severely affected trees, no treatment has thus far been successful in restoring normal gum yields.

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