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SOME RESULTS OF THE INVESTIGATIVE WORK ON WOOD.

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Research work conducted at the School of Forestry on the properties, defects and uses of wood has received a decided impetus through the cooperative agreement recently entered into between the School of Forestry and the Western Pine Manufacturers' Association. This agreement calls for the carrying out of a definite program of research which includes specified projects covering problems of immediate and vital interest to the western pine industry. The problems, so far outlined, deal mainly with improvements in the use of the wood products and include for study such factors as natural durability, moisture content in relation to decay and stain, and new commercial uses for certain species. The Western Pine Manufacturers' Association, through its research department, is conducting some very interesting and valuable experiments on the performance of Pondosa pine in service, on the shrinkage of Pondosa pine during seasoning and on the relative thermal conductivity of the more important species of the region. The School of Forestry has arranged to cooperate on the project of the performance of Pondosa pine in service, and a study will be made of the stain and decay fungi found attacking this species under service conditions.

Arrangements have been completed for obtaining the additional equipment and personnel necessary to carry out these cooperative projects. Beginning with the opening of the fall semester attention will be concentrated on the development of a research organization actively engaged in attempting to solve some of the numerous problems confronting the lumber industry in Idaho.

During the year an article on the brown stains of lumber has been released for publication.* Since that time a series of experiments on kiln brown stain has yielded, among others, the following interesting and perhaps significant data. The sap was extracted from green sapwood boards of Pondosa pine and western white pine. The slightly cloudy whitish liquid obtained after filtering the extractives, was boiled for periods of 2, 4, 6, and 8 hours. As the boiling progressed, and the solution became concentrated the liquid changed from pale yellow when boiled for 2 hours to a dark brown color when boiled for 8 hours. If boiling continued to the point where the water was entirely evaporated and the residue was allowed to scorch, an odor of burnt sugar was noticed. These facts help to substantiate the transfusion and deposit theory as given in the article cited above. Full reports on these and related tests on kiln brown stain will be issued at a later date.

Several interesting results have been obtained from the tests conducted this year by students in the School of Forestry who were completing their thesis requirements. Some of these results are well worth reporting at this time.

In a series of tests conducted for the purpose of determining the soaking property of various woods, sapwood and heartwood sticks of Pondosa and western white pine were used. Separate sets of these sticks were placed upright in earthenware jars and the lower ends immersed to a measured height in different liquids: water, 5% solution of zinc chloride and grade 2 coal tar creosote. Each stick was finished with two surfaced or planed faces and two rough faces. In all cases the liquids

* The Brown Stains of Lumber by E. E. Hubert, Timberman, 27:44,45,48,50,5 figs, May, 1926.

mounted the sticks on the rough faces to a far greater height than on the smooth faces. A great difference was found between the soaking qualities of sapwood and those of heartwood of Pondosa pine, but little difference in the case of western white pine. The rate at which the various test sticks absorbed the liquids was also recorded and the difference noted when different liquids were used. The results of these tests are furnishing data of value to durability and wood preservation studies.

A series of experiments of interest to forest fire fighters was conducted by two seniors who used decayed wood in one test and sound wood in the other. The purpose of the experiment was to determine the time and temperature necessary to first char and then ignite the material and then to determine the length of time the test material would hold the glow or live coal. The effect of different moisture contents was also recorded. The results indicated that the rotted wood burst into flame at a much lower temperature than sound wood and invariably held the glow much longer. Brown stringy rot of white fir caused by the Indian paint fungus carried the the glow longest, while the white pocket rot produced by TRAMETES PINI glowed but a short time. Of the three rots tested the brown stringy rot was the easiest to ignite. The results obtained with the white pocket rot approached the results obtained for sound wood. The moisture content of the sound and rotted test pieces was found to have a decided influence upon the results. The temperature and the length of time to char and ignite the test pieces was increased by an increase in moisture content and in most cases the period of glow was greatly shortened. In sound wood it was noted that the sapwood of the species tested held the glow much longer than the heartwood, the moisture content being equal. In brown rotted wood of low moisture content the glow continued until the test pieces were reduced to ashes. Brown rots are common in the roots of many conifers, and one of these punky roots traversing the fire line just beneath the soil surface may easily act as a slow fuse to carry the fire across the carefully cleared fire lane to the inflammable debris on the other side.

A study of shrinkage in mill run 4/4 inch stock during seasoning was also begun this year by one of the seniors. This was a preliminary study to determine the relative shrinkage in seven local species of freshly cut lumber as it occurred in the three arbitrary moisture content groups: 0-10 percent, 11-20 percent, 21-30 percent. The species studied were western white pine, Pondosa pine, western larch, Douglas fir, lowland white fir, Engelmann spruce and western red cedar. Most of the material tested was slash grain with the exception of one set of edge grain larch boards used to compare with slash grain larch. The tests showed considerably less volume shrinkage in edge grain when compared with slash grain larch. However, the tangential shrinkage was greatest in edge grain larch. Western red cedar showed the smallest percentage of shrinkage of all the species tested with Douglas fir showing the greatest. The high values for Douglas fir can be accounted for in part by the presence of early decay in some of the test boards. This relation also held for the comparisons of the rate of shrinkage. Engelmann spruce showed a fairly high shrinkage while Pondosa pine and western white pine showed relatively low shrinkage percentages and were listed next to western red cedar. Grand fir showed a surprisingly low rate of shrinkage. Interesting results were obtained when the data were plotted and graphs drawn. Air seasoned stock kept in the laboratory for a month showed a rapid loss in moisture and an appreciable shrinkage indicating that care should be used in selecting lumber for interior finish if excessive shrinkage is to be avoided. These preliminary tests will be continued this fall and a check obtained on the present data.