

1896

The Tanning Principles of Plants

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THE TANNING PRINCIPLE OF PLANTS

BY

FREDERIC J. SMITH M.S. Horticulture 1896

1896

A BRIEF ABSTRACT

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The tanning or astringent principles are widely distributed in plant life and infusions of those parts rich in tannin have long been used in the art of converting animal hides into leather.

Since Deyeux discovered and separated Gallo-tannin acid from gall nuts in 1795, the tannins have been the subject of much investigation by chemists.

In the study of plant life, the Botanists have also endeavored to discover what role the tannins play in plant physiology. Hence a study of tannins form a good topic for both branches of science.

While the microscope was used to make qualitative tests for tannins over a wide range of native and cultivated plants, the qualitative determinations have been confined to two species of native forest trees, viz:- the Hemlock Spruce (*Abies Canadensis*) and the White oak (*Quercus Alba*), and which are used as commercial sources of tannin. Specimens of these trees were selected and continued under observation as long as materials were needed to carry on the work. Samples of bark were taken from different size trees beginning with the larger roots, and from the trunks as near the ground as practicable; also midway and near the top.

Samples were taken from the same specimens in October, January and in the spring when the sap had started to flow.

Microscopical examinations on the freshly gathered materials showed the presence of tannin in the bark from all parts of the trees of both species.

The woody portions of the Hemlock Spruce did not respond to the test as did the Oak.

The richness in tannin of the medullary rays in the smaller oak roots is especially worth noting.

Tannin bodies mixed with starch grains (resembling potato starch) was a very prominent feature in the cambium of small Hemlock roots while the tree was dormant.

Notable also was the abundance of tannin in the opening buds of the oak.

The analytical tests were performed by the Lowenthal, volumetric and Proctor's powdered hide methods for comparison.

Analysis shows the storage of tannin greatest in the base of larger and older portions of trees of both species, and the bark of the larger was especially rich, often showing double the percentage of tannin than bark from the same trunk.

There seems to be little seasonal variation of the distribution of tannin in the bark and the custom of felling trees for their tannin in the spring when the bark will peel readily can be followed without loss.

Whether it would be economical to pull the stumps and secure the richer tan bark of the roots would depend on local conditions or if the land were to be cleared for agricultural purposes.

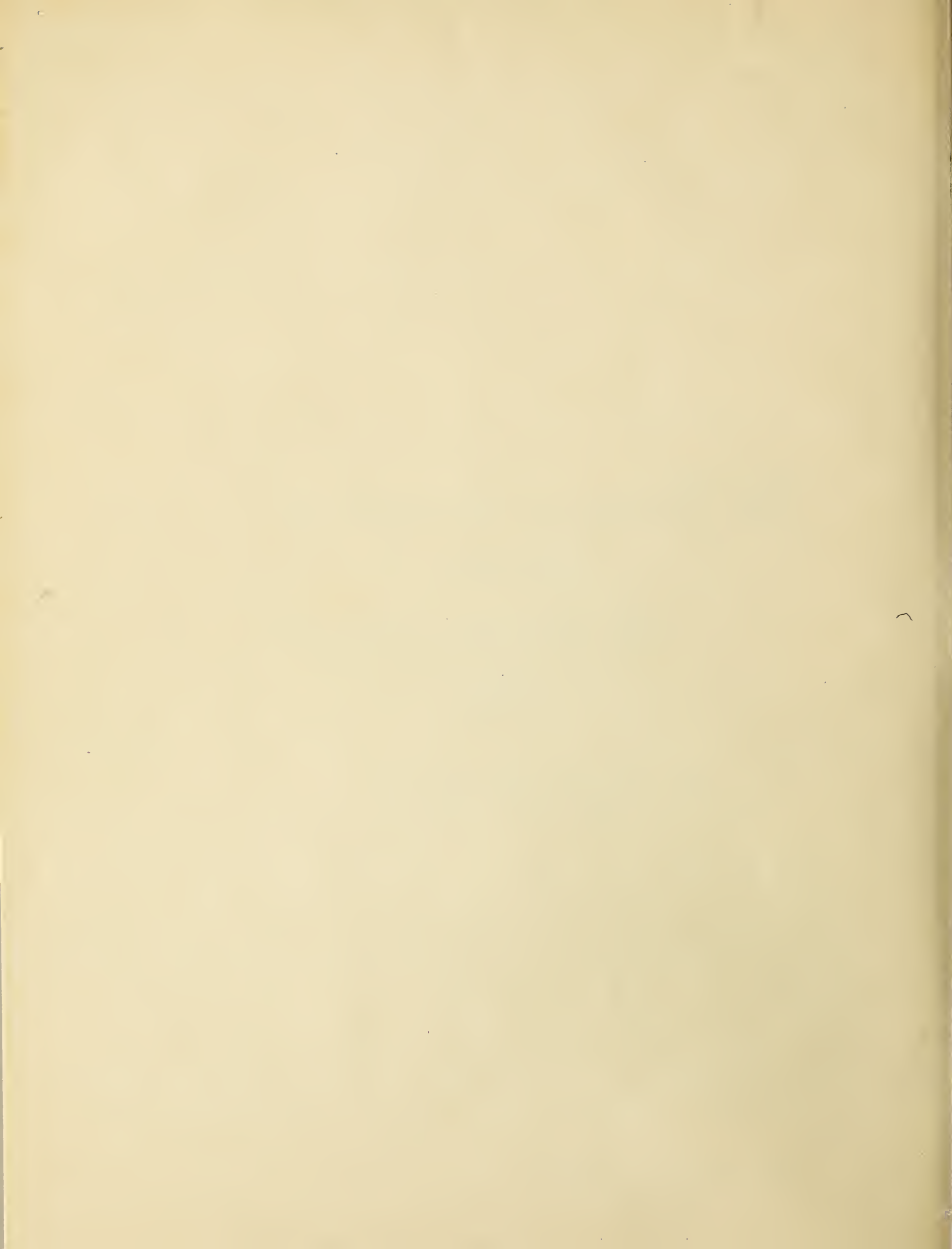
From the fact that tannins have a strong attraction for oxygen, as well as albuminous matter, and their tendency to form glucosites with grape sugars suggests their function in the plant is to assist in assimilation, acting possibly as a reducing agent in the growing tissues and as a means of storing reserve nutrients in the more dormant plants.

That its activity in growing tissues is of short duration may be assumed, as tannin bodies are found in abundance in tissues that have ceased to grow, which has led some botanists to believe they are a by-product and not an essential to the growing tissue.

The Tanning Principle of
Leathers.

By Theodore S. Dwight
1846.

A brief Abstract.



The Tanning or astringent principles are widely distributed in plant life and infusion of these parts rich in tannin, have long been used in the art of converting animal hides into leather.

Since Deyenx discovered and separated gallo-tannic-acid from gall nuts in 1795, the tannins have been the subject of much investigation by chemists.

In the study of plant life, the Botanists have also endeavored to discover what were the tannin principles in plant physiology.

Hence a study of the tannins form a good topic for both branches of science.

While the microscope was used to make qualitative tests for tannins over a wide range of native and cultivated plants, the quantitative ^{determination} ~~study~~ has been confined to two species of white oak tree viz; the American species (*Quercus canadensis*) and the White oak (*Quercus alba*) which are used as commercial sources for tannin.

Specimens of these trees were collected and
continued until the observation, as long as possible
was made. ~~Specimens of wood~~ were used to dry the wood.

Samples of wood were ^{taken} from different size trees
beginning at the larger ^{with} ~~top~~ and from the
trunk as near the ground as possible in the
middle and near the top.

Samples were taken from the same specimens
in October, January and in the spring when
the sap had started to flow.

Microscopical examinations of the sections
gathered mentioned showed the presence of starch
in the wood from all parts of the trees of both
species.

The woody portions of the sections of some did
not respond to the test as did the other.

The cellular contents of the membranes were
in the smaller size water is equivalent with
starch.

A main body mixed with starch grains (resembling
potato starch) was a very prominent feature in
the cambium of small horizontal roots while
the tree was dormant.

Notable also was the abundance of tannin in
the opening tube of the cell.



The analytical tests were performed by
the Forestry Commission and Forest Research
side methods for comparison.

Analysis shows the strage of tannin greatest
in the ^{back of} larger and older portions of trees
of both species, and the back of the larger roots were
especially rich, often showing double the ^{percentage}
of tannin than back from the same trunk.

There seems to be little seasonal variation of
the distribution of tannin in the back and
the custom of felling trees for timber in
the spring when the back will find ready
work be followed without loss.

Whether it would be economical to pull the
straps and secure the richer tan bark of the
roots would depend on local conditions or if
the land ^{is to be} cleared for agricultural purposes.

From the fact that the tannins have a strong
attraction for oxygen as well as other
matter, and their tendency to form ^{est} complexes with
sugar, ^{suggests} their function ^{in the plant} is ^{to} ^{act} ^{as} ^a ^{strong} ^{agent} ⁱⁿ ^{the}
kind of assimilation ^{acting} ^{present} ⁱⁿ ^{the}
primary tissues and as a means of storing reserve
nutrients in the more dormant ~~tissue~~ ^{parts}.

That its activity in growing tissues is of great



Ammonia may be ~~water~~^{assumed} as tissue water
are found in abundance in tissues that have
ceased to grow or which ~~are~~ - led some botanists
to believe ^{they are} ~~them~~ a by-product and not ^{an} essential
to ^{the} ~~growth~~ of many tissues.

