

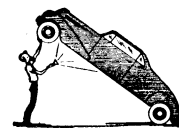


### Lowly Evergreens

➤ "EVERGREEN," to most of us, immediately connotes tall trees like pine, spruce and fir; perhaps also, to dwellers in the warmer parts of this country, trees and shrubs with persistent broad leaves, like rhododendron, live-oak and some of the magnolias. But the woods are literally full of evergreens that are only a few inches tall; for any plant is properly classifiable as evergreen if it is just that—ever green, holding to its leaves, or at least a large part of them, instead of shedding them in autumn and growing an entire new set in spring.

Some of our loveliest woodland flowers qualify thus as evergreens—the arbutus that is in bloom right now on acid soils in Eastern woods, and the wider-ranging hepatica that will soon be unfolding its bluish-white bells. One of these lowly but lovely plants gets its name from the perennial character of its leaves: the wintergreen.

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There are flowerless evergreens on the forest floor, too: most mosses, several species of fern, and those interesting spiny-leaved fern relatives known as ground-pine and club-mosses. As a matter of fact, the evergreenness of some of these is proving their undoing, for market-gatherers take merciless toll of several species of these plants, notably the ground-pine.

One thing especially noteworthy about these lesser evergreens—indeed, about evergreens generally—is the gradual darkening of the leaves as they grow older. In some species, too, there is a reddening or purpling that may even come to mask the dark green

entirely. This empurplement of evergreen leaves is seen most strikingly in the last-year foliage of the hepatica. It is especially noticeable after the new leaves begin to develop, for you will find a crown of light green leaves standing up above a lower circle of the purplish old ones.

This reddening or purpling of persistent leaves seems to be a response to winter conditions—whether low temperature or exposure to slanting sunlight striking through the leafless woods is not quite certain. Botanists who have worked in the Arctic remark on the prevailing redness of all foliage there.

Science News Letter, March 26, 1949

### AERONAUTICS

## More Thrust Power Needed

➤ VARIOUS means for increasing the thrust of airplane jet engines for short periods have become of particular importance in increasing the effectiveness of this type of power plant, the Institute of Aeronautical Sciences was told in Cleveland by Bruce T. Lundin of the National Advisory Committee for Aeronautics.

Thrust augmentation, he called the additional power for spurts. Thrust augmentation methods are finding principal application, he said, in improving the take-off and climb characteristics of jet-propelled aircraft, as well as improving the combat and high speed performance of many military aircraft. He discussed three methods of thrust increase now in use. They are tail-pipe burning, water injection, and the air bleedoff method.

Tail-burning involves what is often called an after-burner. Exhaust gases from the regular engine pass through it, and additional combustion results which contributes to the total thrust. The successful application of tail-pipe burning, the scientists were told by Melvin S. Feder and Richard Hood, also of the Cleveland laboratory of the NACA, depends in part on the development of satisfactory control systems.

In general, they stated, control systems for all jet engines must be designed to give safe and stable engine operation over the desired thrust range. Thus, those variables which may cause engine failure must be controlled in addition to the control of variables which facilitate changes in thrust. Excessive engine speed or turbine inlet temperature cause engine failure. Therefore, for the jet engine with tail-pipe burning, engine speed and turbine inlet temperature must be controlled.

For continued operation of an airplane at speeds one and one-half that of sound, jet engine after-burning or tail-pipe burning is the only method of jet thrust increase that increases the maximum range of the plane over that obtained with a normal jet engine, Eldon W. Hall, of the same laboratory, told the meeting.

Discussing a comparison of various methods of thrust augmentation, he stated the

results of studies indicate that either bleedoff or rocket assist offers the possibility of large thrust increases at the expense of high specific fuel consumption. Water injection offers simplicity and light weight.

Science News Letter, March 26, 1949

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