

sugar off the trees, and patches of recrystallized sugar may then be found at the base of trees or on the ground. Frequently, however, in this situation it does not recrystallize but may be found in a fluid or semi-fluid condition which is attractive to flies and other insects. Sometimes, as above mentioned, insects feed on the sugar while still on the trees, and it is reported that bears go after it, causing the breakage of many branches.

EXUDATIONS BY OTHER PLANTS.

As is well known, many plants have structures known as water-pores, situated usually at the tip or apex of the leaves, and, in the case of lobed leaves, often at the tips of the lobes or teeth along the margin. Occasionally when the root-pressure is very active, so much water is forced up into the plant that the leaves become gorged with water which escapes through these water-pores—comparable to a kind of safety valve. Most people are familiar with the drops of water at the tips of grass leaves in the morning after a hot dry summer day and a cool, clear night, giving origin to the Scotch saying, "Ilka blade o' grass keeps its ain drap o' dew".

In some localities, where the soil is calcareous, minute white incrustations of lime are found around the water-pores; these incrustations may be found on grasses, and are of common occurrence on certain species of Saxifrages which show them on every tooth along the margin of the leaves, such incrustations are small, and are only formed under certain ecological conditions, in which temperature of the soil and atmosphere, and water content of the soil are important factors.

FACTORS INFLUENCING EXUDATION OF SUGAR.

A review of the distribution, and various factors influencing the production of sugar by Douglas fir, will prove of especial interest to physiological and ecological botanists, to whom the phenomenon will serve as a splendid illustration of the influence of environment on a plant which under ordinary conditions in British Columbia does not exude sugar.

DISTRIBUTION.

The region in which sugar-bearing Douglas firs are most abundant, lies between the 50th and 51st parallels and between 121°-122° long. This includes the driest and hottest part of the dry-belt of British Columbia. Within this area they are rather common in the Thompson valley west of the mouth of the Nicola river, also near the junction of the Thompson and Fraser rivers at Lytton; they have been found a little above Lilloet in the Fraser valley, but according to present information are not known to occur north of Clinton in this region.

About 10 miles north of the apex of the angle formed by the junction of the Thompson and

Fraser rivers, lies Betani valley, at an altitude of between 3,500 and 4,000 feet, some years sugar is comparatively abundant on trees in this region; the geology and flora is very different from that of the adjacent Thompson or Fraser valleys; here one may find sugar-bearing Douglas firs growing on the southern and south-western slopes having the greatest sun exposure. The soil produces a thick covering of grass and other vegetation, indicating a plentiful supply of available soil moisture; differing in this respect from the dry gravelly southern and south-western slopes of the main valleys of the Fraser and Thompson.

Suitable habitats are found at intervals over a considerable area of the dry-belt regions, in addition to samples received from the north and south sides of the Thompson river near Spence's Bridge, Douglas fir sugar has been reported from around Kamloops and Savona, also from the Nicola and Similkameen valleys, and is said to be found in the southern part of Okanagan valley. In-so-far as the chief of the Kootenay Indians is aware, it is not known in the Kootenay country although it is reported by an Indian as being found in eastern part of Washington state, United States.

HABITATS.

The habitats in which sugar-bearing firs are found, are usually on gentle slopes facing east or north in that region of the dry-belt where the Douglas fir is encroaching on the dry-belt flora. The trees are in comparatively open areas with abundant exposure to the sun.

SOIL MOISTURE.

As a rule, sugar is not found on trees situated on fully exposed southern or western slopes, nor on areas where Douglas fir forms a dense forest. Southern and western slopes, exposed to the full heat of the sun, dry out much sooner than ground gently sloping to the east or north; the greater abundance of soil moisture in the latter is a point to be kept in mind.

ABUNDANT SUNSHINE.

In the region above mentioned the descending zone of the Douglas fir and the ascending zone of yellow pine overlap, so that the trees are well exposed to the sun, not being so crowded as to limit the foliage to a narrow crown, as happens in dense forests. An abundance of leaves exposed to the sun will result in an abundant formation of carbohydrates during the day; under ordinary conditions these carbohydrates would be removed from the leaves and transported to growing tissues or storage tissues during the night. This normally takes place in most plants, including Douglas fir in its natural habitat in the coast area where it forms dense forests of gigantic trees.