

NATURAL REGENERATION IN JUNIPER

By H. VEDEL

The Royal Veterinary- and Agricultural College, Copenhagen

In *Proceedings B.S.B.I.*, Vol. 3, p. 474 (1960), members of the Society were asked to assist in studies of *Juniperus communis* in the south-eastern parts of England, as the Nature Conservancy had expressed concern at the failure of the species to regenerate.

At the Department of Botanical Taxonomy and Forest Botany of the Royal Veterinary and Agricultural College of Copenhagen this problem has been studied for some years, and as a member of the staff I give below a brief survey of some of the results hitherto achieved concerning the biology and ecology of *Juniperus communis*.

The investigations were started in a conserved area of juniper scrub situated in North Sealand. This stand was in danger partly owing to a considerable invasion of deciduous trees and conifers, and partly because regeneration did not take place.

A study of the history of this juniper scrub as well as investigations into other juniper stands shows that the fate of juniper communities is dependent on man's use of the areas, especially as pasture land, as well as on edaphic conditions.

The following survey is intended to assist in the elucidation of these problems by giving brief explanations and descriptions of areas in which seedlings and very young individuals of juniper have been found:

- | | | | | | |
|----------------------|--|--|--|---------------------------------------|----|
| 1) in grazed areas | | grazed by domestic animals | | commons with heather dominating | a. |
| | | | | commons with grass dominating | b. |
| | | grazed by deer | | grassy area in woodland | |
| | | | | under trees on <i>Calluna</i> -heaths | d. |
| 2) in ungrazed areas | | poor sandy soil | | | |
| | | abandoned fields on light soil | | | |
| | | windbreaks in inland dunes | | | |
| | | banks along newly made roads | | | h. |
| | | south-exposed sheet of rock with sparse vegetation | | | |
| | | under cut-down individuals of female junipers | | | |

- a. In areas comparatively little grazed by cattle and horses, covered with dominant *Calluna* together with several other heath components. Rather often seen in Denmark.
- b. In areas with more heavy grazing, covered with degenerate *Calluna* heath. Very rich in "grasses" (*Agrostis tenuis*, *Deschampsia flexuosa* and *Luzula campestris*). Several places especially in Jutland.
- c. One example: an old beech forest with a small area of grassland often grazed by deer. In the grassland stand two old beech trees, under which were found about 10 junipers from 1-10 years old. The distance to the nearest juniper scrub is about 3 miles.—Sweden (Bjerke, unpublished).
- d. Under scattered trees in compact *Calluna* heaths, the vegetation changes from *Calluna* to grasses and sedge. These areas are sought by roaming deer. Rather often found in Sweden and Denmark.
- e. On poor sandy soil with *Polytrichum juniperinum*, *Cornicularia aculeata* and *Cladonia* spp. Moreover *Carex arenaria*, *Corynephorus canescens* and *Empetrum* occur. The vegetation does not cover the ground.—The Isle of Anholt.
- f. In Tibirke Hills in North Sealand a field of potatoes, abandoned in 1928, has grown into juniper scrub and *Calluna* heath. The area has not been grazed, at least not by domestic animals.
- g. Böcher (1941) points out that in the inland dunes of Hovborg Sande (Jutland) juniper is especially common in the windbreaks.
- h. On banks along newly-made roads on sheets of mineral soil where other vegetation is sparse.—Several places in the Isle of Bornholm.
- i. On south-exposed slope with rock beneath. Vegetation sparse, characterised by *Helictotrichon pratense*, *Poa compressa*, *Festuca ovina*, and *Cladonia* spp.—The Isle of Bornholm.
- j. In *Calluna* heath with many juniper shrubs, several juniper seedlings were found at a place where, three years before, a low and broad female juniper had been cut down. The vegetation on this spot is dominated by *Carex arenaria* and *Deschampsia flexuosa*.

The occurrence of patches devoid of vegetation is common in the grazed as well as in the ungrazed areas (groups 1 and 2). This is self-evident as regards the ungrazed areas mentioned above, and it is also well-known that grazed areas are much worn by the activities of cattle.

Whereas the natural regeneration in juniper in very different areas—which, however, all offer the germination of juniper seed good conditions—has been briefly accounted for above, results of some newly-begun studies concerning the seed dispersal cannot as yet be given. However, German and American observers point

out that juniper seed is dispersed by thrushes and crows—I believe that gallinaceous birds are of importance too—and by hares and sheep.

American authors specially emphasize the importance of sheep to the seed dispersal of juniper. Miller (1921) gives a very convincing account of how *Juniperus utahensis*, in 25 years, has spread over 10,000-15,000 acres in Arizona due to the activities of sheep.

I consider it highly probable that the cause of the very large and uniform juniper scrubs in Scandinavia, especially in Sweden, is to be found in effective seed dispersal combined with optimal conditions of germination, which are both the result of grazing by domestic animals (especially sheep) and of fluctuations in the intensity of grazing, seeing that the young juniper plants in the first years of their lives will not stand grazing.

Further investigations and observations, made after the above notes were written, indicate that the growth of the young junipers mentioned in the groups *c.* and *d.* is due to an interaction between different birds and the grazing animals, in that the birds when perched in trees drop the juniper seed to the ground, which is optimally prepared for germination by the grazing animals.

REFERENCES

- BÖCHER, T. W., 1941, Vegetationen paa Ranbøl Stede., *Kgl. Danske Vid. Selsk., Biol. Skr.*, Bd. 1, No. 3.
- ELLISON, LINCOLN, 1960, Influence of grazing on plant succession of rangelands, *Bot. Rev.*, 26, 1.
- MILLER, FRED H., 1921, Reclamation of grass lands by Utah Juniper on the Tusayan National Forest, Arizona, *J. For.*, 19, 647-651.
- VEDEL, H., 1960, A list of trees and shrubs on the isle of Anholt with comments on some spontaneous and subsponaneous species, *Dansk. Dendrol. Arsskr.*, 5.