VARIATION IN AND ECOLOGY OF ASPEN

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Project Number 150

The factors controlling the regeneration of aspen have long been a puzzle to ecologists in the Jackson Hole region of Wyoming. Many years ago attempts were made to stimulate shoot production and new growth elongation by (1) mechanical treatments, (2) removal of mother trees, (3) fertilization; but all of these resulted in failure. More recently attempts to stimulate aspen shoots through fire (aspen community burning) have also resulted in failure.

As a preliminary conclusion from biomass studies in 1974 in the Jackson Hole region a key seems to have been found to the aspen regeneration cycle. These results will need to be checked but they seem to fit most field situations.

Biomass data has been divided into three classes (1) leaf surface, (2) above ground stems, (3) below ground stems and roots.

While the mass of below ground stems and roots is important to the overall appearance of the community, the mass is the least variable of the three and does not seem to be a key to shoot production.

When a new stand is developing from either a shoot or a seedling the relationship of leaf surface to stem mass to below ground mass remains in balance, and continues in balance until the stand starts to mature, i.e., up until the beginning of the development of a fairy ring. The balance now continues around the outside of the stand but is upset in the center. Relatively less leaf surface for the support of stems and roots (carbohydrate reserve drain) immediately expresses itself in the failure of the stand to produce new roots in the center even though the ecological conditions may become similar to those on the outside of the ring. The only factor differing is the continual reaching of maturity of the trees around the center of the ring. The enlarging of the ring will continue until some factor upsets this overbalance of stems such as fire or windfall or disease.

Under excessive browsing pressure from ungulates the whole stand will resemble the center of a natural ring and there will be no regeneration. Since these stands are often characterized by the extremely large trunks of the remaining trees there has been speculation that the lack of new shoots is related to the age of the stand or clone. This, however, does not appear to be the case. When a sufficient number of old trees have died to bring a balance back between leaf surface and stem mass there will be

automatically an increase of new shoots. In fact a complete loss of old trees may result in excessively thick doghair stands to the height of the winter snow, especially where the leaf surface area is proportionately at a maximum. There seems to be a possibility that this situation will produce the maximum aspen browse possible for ungulates. However, the climax aspen stand will have ceased to exist and only a deformed disclimax will remain.

If these browsed stands persist under heavy ungulate pressure on south slopes where the snow blows away in winter an even more deformed disclimax may persist with the aspen shoots little different than a minor component of the herbaceous cover.

(Assisted by Don Meeker, University of Wyoming; supported by McIntyre-Stennis Federal Research Program.)