Cultural Methods of Establishing Grass with Sweetclover and the Effect of Varying the Percentage of Grass and Sweetclover on the Crop Yield

Felix M. Entenmann, John L. Schwendiman, and J. K. Patterson

Agriculture in eastern Washington and particularly in the Palouse region has developed around a wheat-pea or a wheat-summerfallow rotation system. Since neither wheat nor peas are effective in controlling erosion, it is desirable to introduce a sod crop into the farming program to aid in reducing the erosion hazard and to restore or maintain the soil fertility.

A continuing 5-year project was established having the following objectives: 1. Development of a practical method of establishing definite quantities of grass with sweetclover for maximum erosion control; 2. A study of the relative contributions of sweetclover and grass tops and roots to total production in mixtures; 3. The determination of the correct ratio of sweetclover to grass for maximum soil building; and 4. The maintenance of a satisfactory level of grain production in the rotation. This paper is a report of the yield data for the first 2 years of the study.

LITERATURE REVIEW

For many years sweetclover was considered a weed, and its value in maintaining soil productivity was not recognized until about 1900 (5). McMichael in Washington found that sweetclover was well suited for soil improvement. Its biennial habit of growth permits its use in a short rotation. Sweetclover-grass mixtures were first tested by the Pullman Nursery Unit of the Soil Conservation Service cooperating with the Washington Agricultural Experiment Station in 1937 (1). By 1946 Spanish sweetclover and Bromar mountain bromegrass proved to be one of the best sweetclover-grass mixtures for eastern Washington. Bromar is an improved strain of mountain bromegrass. It is a short-lived perennial bunchgrass which reaches its maximum seed and forage production during the second season after seeding; hence it does well with sweetclover (3).

Douglas (2) found that adapted grasses in a mixture with sweetclover add 1000 pounds more root material per acre to the soil. Law and Schwendiman (3) reported that grass in such a mixture provides an extensive root system that was effective in controlling soil losses. The total yield of a sweetclover-grass mixture was about one-third root material while only one-fifth of the yield of sweetclover alone came from roots. Jackson reported that production of sweetclover alone was 17.6 bushels per acre of oven-dried material, of which the tops constituted 89% of the total nitrogen of the sweetclover.

MATERIALS AND METHODS

The species selected for this study were Spanish sweetclover and Bromar mountain bromegrass. The mixtures were planted in the Soil Conservation Nursery Farm near Pullman in a field with a gentle south slope of Palouse silt loam soil.

Spring wheat stubble was fall plowed and left rough over winter. Seeding were made in 1949, 1950, and 1951. The plots were spring cultivated with a spike-tooth harrow and later they received a shallow weeding with a rod weeder, were harrowed again, and rolled twice before seeding.

The sweetclover-grass mixtures were seeded in alternate rows on the contour in plots 16 by 30 feet. Each plot was a randomized complete block with four replications. Six treatments were as follows:

a. Sweetclover alone
b. 3 rows sweetclover—1 row grass
c. 2 rows sweetclover—1 row grass
d. 1 row sweetclover—1 row grass
e. 1 row sweetclover—2 rows grass
f. 1 row sweetclover—3 rows grass

e. 2 rows sweetclover—1 row grass
f. 1 row sweetclover—3 rows grass

The seedings were made with an 8-foot grain drill which had been partitioned to seed alternate rows. Forage samples were taken when the material reached the green manure stage in the Palouse area. The sweetclover was at a stage of growth from one-eighth to one-fourth bloom, and the grass was in the dough stage. Four square-meter, random samples were taken from each plot. Following harvest, all samples were oven-dried.

Root samples were harvested to a depth of 8 inches, and their location in each plot. A steel quadrat with an area of 4 square feet was used as a frame. The samples were weighed, oven-dried, separated, and weighed. Total nitrogen and phosphorus content of tops and roots were made following a modification of the Kjeldahl procedure (4).

Following harvest of second-year material, all mixtures were cut down to a stubble height of 4 inches. The top growth remained on the surface of the soil for approximately 3 weeks and was then disked into the soil. The ground was left by the left disk while Brevor wheat was fall seeded. At maturity (fall harvested; four 1-square-meter quadrats were taken. Weight in bushels per acre and test weights were determined using a 50-lb. or 100-lb. round-type disk. Weight in bushels per acre and test weights were determined using a 50-lb. or 100-lb. round-type disk.