

ROOT PRODUCTION OF GRASSES AND SWEETCLOVER IN CONSERVATION MIXTURES

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The most fertile agricultural soils of the world including Palouse silt loam were formed under a grassland cover. After 50 years of cropping to a wheat-summerfallow and wheat-pea system approximately one-third of the original organic matter and one-fourth of the available nitrogen have been depleted by cropping or by erosion. Marked erosion began when about one-fourth of the original organic matter was destroyed. Fibrous root material is practically non-existent in grassland soil after 50 years of cash cropping. Conservation nursery and agricultural experimentation station studies have shown that it is possible to rebuild fibrous root material and associated erosion resisting qualities by use of grasses and grass-legume mixtures in the rotation. Since 1942 information on root production of grasses alone and in mixtures with sweetclover has been obtained as part of a sweetclover-green manure study.

Sweetclover-grass mixtures have proven superior to seedings of sweetclover alone. In the Palouse area Spanish sweetclover is recommended at 5 pounds per acre with any one of the following grasses and rates: Mountain brome grass (deawned), 10 pounds per acre; slender wheatgrass, 8 pounds per acre; tall oatgrass (deawned), 6 pounds per acre; or orchardgrass, 5 pounds per acre. Root samples were taken to a depth of 8 inches each year just before plowing the mixtures under for green manure. Sweetclover alone had 26 percent of its total growth, as roots in the surface 8 inches. Orchardgrass which

usually has a root-top ratio of 6 to 1 was the heaviest root producing grass studied. Orchardgrass in mixtures with sweetclover produced 3700 pounds of oven dry root material per acre. This was approximately twice as much as sweetclover grown alone and three times the root material of sweetclover grown in mixtures. A four year average of all mixtures studied shows that the use of grass with sweetclover adds approximately one thousand pounds of root material per acre to that obtained when sweetclover is grown alone. In mixtures 23 percent of the top production and 62 percent of the root production was found to be grass when the recommended seeding rates were used. Plowing under sweetclover to provide nitrogen and grass to provide fibrous root material and erosion resisting qualities appears to be a practical method of maintaining fertility and retarding erosion.

Apparently grass is one of the few crops that can be utilized agriculturally and still have a beneficial effect on the soil. The effect of grass roots in the soil is to increase the organic matter, increase the nitrogen, increase the calcium, increase the moisture carrying capacity and improve the physical and chemical characteristics of the soil. Grass roots decompose less readily than leguminous roots; therefore, have a longer lasting beneficial effect on soil characteristics important in soil conservation. By the addition of grass to leguminous mixtures, it is possible to increase the organic matter in the soil more rapidly than by using legumes seeded alone. Grass roots build soil.

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