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Seed Retention of Some Prairie Plants¹

By A. L. BAKKE AND E. P. SYLWESTER

There are still a number of native prairie areas in Iowa. One of these outstanding tracts belongs to the Steel family of Cherokee, Iowa. It consists of about half a section located in Cedar Township in Cherokee county (N. $\frac{1}{2}$ Sec. 16) one and a half miles northwest of the town of Larabee. The area has never been plowed: as a matter of fact, it has never been fenced. The flora of this area, like most of the other generally treeless areas of the state consist largely of perennial plants of a distinctly xerophytic type (1.3.4.5). The *Graminae* are the most numerous, although exceeded in generic numbers by the *Compositae*, with the *Leguminosae* in third place.

In the more highly developed soils, with better drainage and increased organic content, the dominant grasses include porcupine grass (*Stipa spartea* Trin.), little blue stem (*Andropogon scoparius* Michx.), Prairie drop seed (*Sporobulus heterolepsis* Gray), and numerous sub-dominant plants such as species of sunflower (*Helianthus*), golden rod (*Solidago*), blazing star (*Liatris*), tickseed (*Coreopsis*), and prairie clover (*Petalostemum*). Exposure to evaporation, as determined by temperature, wind and topography, is the primary cause of the treelessness according to Shimek (3.4).

It has been the general rule for owners of prairie land in Cherokee County to mow the area rather late in the season, and feed the hay to livestock. In one case the owner fed such prairie hay to horses and then later scattered the manure back on the prairie ground from which the hay had originally been taken. Freshly cut forage contains about 70 to 80 per cent moisture. Under most conditions of natural drying, the moisture content must be reduced to 20 to 25 per cent or below for storage of hay in the mow in order to avoid serious deterioration in quality, loss of nutrients from fermentation, and danger of spontaneous combustion. For several years the authors have had an opportunity of watching this system of management and wondering whether there was enough seed retained by the respective growing plants at the end of the growing season to make any difference in the survival of prairie plants. Shimek (3) has made the statement that no native prairie species has entirely disappeared though all have been much reduced and in a

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few cases almost exterminated. Perhaps the most striking example of the kind is that of one of the blazing stars (*Liatris squarrosa* (L.) Hill once extremely abundant. Seed dispersal probably largely accounts for the grouping of plant societies on the prairie but does not account for the presence of the prairie flora as a whole. Considerable litter is present and serves to fix species already present by not presenting conditions for development. Rudman and Pohl (6) have suggested the use of fire for desired changes in vegetative composition.

From the point of view of the stockman, the hay is valued because of the grasses, tall blue stem, little blue stem, Indian grass, (*Sorghastrum nutans* (L) Nash.), and Panic grass (*Panicum scribnerianum* Nash.). The stockman regards a non-grass plant as a weed. The authors were impressed with the almost 100 per cent suppression of small and giant ragweed in the area, the former being an extremely common pasture weed all over Iowa. While it was common in all adjacent areas, there was none in the prairie tract under consideration.

On a trip to Northwest Iowa on October 9, this last year the writers found the hay on the Steel Prairie had been cut and baled as in former years. It seemed desirable to determine the species of prairie plants in seed and to see whether there were enough seeds present on the plants found in the bales to materially aid in using such hay for revegetation work. The hay was in excellent condition, with an excellent color and aroma. There had been no rain to speak of during the month of September and the early part of October (7). The seeds present had been thoroughly dried without any extra handling of the hay in the baling operations.

The conditions giving rise to the production of viable seed are similar to those necessary in the curing of hay. According to Hodgson et al (2) the underlying principle of drying is the evaporation of water from the surface of the forage. The removal of moisture by the surrounding air is the same for both natural and artificial dehydration. The rate of drying depends on the amount of water in the forage, the temperature and humidity of the surrounding air, the rate the moisture laden air is moved, the kind of forage and the kind and texture of the plant material. High quality hay, then is weed free forage, dried under conditions where there is little loss of leaves in handling, no deterioration in dry matter and nutrients, no mold development, and no loss of natural green color and sweetness of the original crop. Under normal curing conditions

losses will occur but these losses should be at a minimum.

The following species of grasses were present: Canada wildrye (*Elymus canadensis* L.), Switch grass (*Panicum virgatum* L.), Tall blue stem (*Andropogon furcatus* Muhl.), Side-oats grama (*Bouteloua curtipendula* (Michx.), Kentucky blue grass (*Poa pratensis* L.), Prairie cordgrass (*Spartina michauxiana* Hitchc.), Panic grass (*Panicum scribnerianum* Nash.), Little bluestem (*Andropogon scoparius* Michx.). Many of the seeds of the grasses had been scattered. However seeds of Canada wild rye, switch grass, side-oats grama, Kentucky blue grass, Indian grass and little blue stem were found. All except blue grass are native.

The non-grass plants were represented by the following: Blazing star (*Liatris pycnostachya* Michx.), Sunflower (*Helianthus rigidus* (Cass) Desf.) and *Helianthus maximiliana* Schrad., Smooth aster (*Aster laevis* L.), many flowered aster (*Aster multiflorus* Ait.), Milk vetch (*Astragalus canadensis* L.) Purple prairie clover (*Petalostemum purpureum* (Vent) Rydb.), Wormwood sage (*Artemisia vulgaris* L.), Lead plant (*Amorpha canescens* Pursh.) Yarrow (*Achillea millefolium* L.), Golden rod (*Solidago canadensis* L.). Evening primrose (*Oenothera biennis* L.) Tickseed (*Coreopsis tinctoria* Nutt.), Rose (*Rosa* sp.), Willow (*Salix* sp.) Vetch (*Vicia Americana* Muhl.), Golden Alexander (*Zizia aurea* (L.) Koch., Mountain mint (*Pycnanthemum virginianum* (L) Durand & Jackson), Black-eyed Susan (*Rudbeckia hirta* L.), Abundant seeds of blazing star, golden rod, aster, lead plant, wormwood sage, coreopsis, yarrow, milk vetch, evening primrose, sunflower, prairie clover were present. The species represented by the largest amount of seed were blazing star and sunflower.

From the number of seeds present, it seems very likely that prairie hay used as livestock feed or for highway mulching could serve to establish many native prairie plants which would furnish competition to unwanted weed species. In view of the noticeable absence of really serious weedy species of plants, such procedure could possibly help alleviate many weed problems on various types of land where weeds become a serious problem.

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