

Some Studies of the Genus *Elymus*

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The genus *Elymus*, commonly known as the rye grasses, includes many species in the northern hemisphere. Deam, in *Grasses of Indiana*, states that 25 species are found in the United States, chiefly in the western states.

The present study is not a taxonomic one but is directed rather towards the habits, reproduction, and chemical nature of the plant with a view to its possible economic value and modification in the direction of greater usefulness to man.

Elymus virginicus L. first came under observation in October, 1937. The original source of materials was a group of plants growing along the roadside in the Ohio river bottoms of Vanderburgh County, Indiana. This is a location frequently inundated at flood time. In November, 1937, *Elymus virginicus* var. *jejunus* (Ramaley) Bush. was collected on the top of Pilot Mountain near Ironton, Missouri, in the Ozark region.

Observation of these species shows that they are perennial. The new growth each year comes from buds at the lower nodes, which are frequently below the surface of the ground. Several new shoots develop from the base of each old culm so that the cluster tends to increase in size annually. One seed of variety *jejunus* germinated in the laboratory in February, 1938, produced a cluster of short culms in 1938 but produced no spikes. In 1939 the same plant with garden cultivation produced 147 fully developed spikes. The species observed will thus maintain themselves, tending to occupy the area more fully each year. These species do not produce rhizomes and show no tendencies which might make them objectionable because of being difficult to destroy, as is the case with some grasses such as the well-known quack grass.

Elymus matures slowly; it does not ripen in the sense that wheat does. In 1939 plants were in full bloom July 5; the spikes were harvested September 16. At this time some green still existed in leaves and culms, and some glumes were green. This occurred in a very dry season. In nature, seeds begin to fall from the plant about November 1 and continue to fall through most of the winter. Seeds lying on the ground were found germinating in February and by March were rooted. Experiments to determine most satisfactory planting time have not yet been completed.

The seed of the rye grasses is elongated in form, similar to those of the cultivated rye. It is usually dark in color. The lemma and palea are partially adherent to the seed and are removed with difficulty. Any threshing operation yields a product very similar in appearance to the cultivated oat.

A chemical analysis of the seeds of variety *jejunus*, after lemma and palea have been removed, gives the following protein content:

1938 crop	27.20% protein
1939 crop	27.22% protein

On the same basis of analysis other cultivated grain yields the following protein content:

	Mean	Range	
Rye ²	12.4%	8.4%	19.%
Wheat ¹	12.2%	8.5%	17.%
Barley ²	11.5%
Oats ²	12.1%	9.1%	15.%
Corn ¹	10. %
Elymus ³	27.2%

In this analysis the total nitrogen in the sample is determined, and this figure, multiplied by a predetermined factor for cultivated rye, was used, since none is on record for Elymus. For this reason, it is probably preferable to compare the nitrogen findings for the grain.

Nitrogen content of cultivated grasses is as follows:

Rye ²	1.98%
Wheat ¹	2.14%
Barley ²	1.84%
Oats ²	1.93%
Corn ¹	1.60%
Elymus ³	4.845%

If Elymus is to have any economic value to man, the size of the seed is of great importance. Considerable variation has been noted. Twenty-seven seeds of *Elymus virginicus* were carefully weighed after removal of lemma and palea; these averaged .00263 gm. When the variety *jejunus* was found, its seed proved to be much larger. Fourteen seeds, weighed under identical conditions, averaged .00407 gm. This represents an increase of 54.7% over the earlier varieties studied.

In the spike of Elymus spikelets are borne in pairs lying close together. Glumes are long, narrow, and indurated. The spikelet contains two or three florets. One or two may mature, but the third seldom contains a seed. The spikelets may disarticulate either above or below the glumes in about equal numbers. Those florets that disarticulate from the glumes may be separated out quite well by sifting and fanning methods. Those which remain attached to the glumes are separated with great difficulty.

General observations indicate that Elymus is very drought resistant. Along the roadside in Kansas in August, 1939, it was quite well-developed although cultivated wheat had been almost a total failure and the corn crop had been destroyed by drought and hot winds.

In its present wild condition the grain of Elymus would scarcely be useful to man except in stock feed because of the adherent lemma and

¹Sherman, H. C., 1924. Food products. New York.

²David, W. A., and S. S. Sadler, 1917. Allen's commercial organic analysis. Philadelphia.

³Done by Department of Chemistry, Evansville College.

palea. If varieties with larger grain which can be separated from adhering coverings can be found or developed, it may find important uses.

Numerous new collections were made in August, 1939, in the states of Nebraska, Wyoming, Colorado, Kansas, and Missouri. These undoubtedly include several varieties. Hybridization has not yet been tried.