

CIRCULAR 16

LIFE SCIENCES
LIBRARY APRIL, 1951

"Circular (Alaska Agricultural Experiment Stations (U.S.))"

EDDA BARLEY FOR ALASKA



Harvesting a field of pure seed Edda barley at Matanuska Station near Palmer

ALASKA
S
33
E22
no. 16

Alaska Agricultural Experiment Station

Don L. Irwin, Director
PALMER, ALASKA

in Cooperation with the

United States Department of Agriculture
Agricultural Research Administration

RASMUSON LIBRARY
UNIVERSITY OF ALASKA-FAIRBANKS

SUMMARY

Edda, an introduction from Sweden, was recommended for the first time in 1951 for all barley-growing areas of Alaska. About 200 bushels of this new barley variety were available for distribution to Alaska growers in 1951 through the Alaska Agricultural Experiment Station. Because Edda is early, stiff-strawed, high-yielding, and of good quality it is expected to have an important place in the production of feed and seed in the Territory. Analytical chemical determinations suggest that Edda is at least equal in feeding value to similar varieties grown in Alaska and to State-side barleys.

Edda Barley for Alaska

By S. C. LITZENBERGER and B. M. BENSIN*

Increased grain yields, stiff straw, earliness, and good seed quality are some of the reasons for releasing Edda barley in 1951 to seed growers. Agronomic results indicate that this variety possesses a greater number of desirable qualities than Olli or Trapmar barley under Alaskan conditions. Edda barley should do much to stimulate grain production in the agricultural areas of the Territory.

About 200 bushels of Edda are available for distribution through the Alaska Agricultural Experiment Station. This pure seed increase was obtained primarily from contracted plantings made by the Montana Agricultural Experiment Station at Bozeman, Montana, and a seedgrower in Aberdeen, Idaho, under irrigation where optimum seed increase could be expected.

The purpose of this circular is to give the origin, description, and performance of Edda in comparison with those varieties commonly grown in Alaska.

ORIGIN

Edda (C. I. 7129) ** was introduced from Sweden into the United States and Alaska by the U. S. Department of Agriculture. It was derived from a cross of Asplund with Vega made in 1925 at the Swedish Svalof Branch Station at Torsta. Edda barley was released to Swedish growers in 1943 and is currently grown there for both cattle feed and human consumption. It was planted in Alaska in nursery trials for the first time in 1945.

DESCRIPTION

Edda is a 6-rowed, hulled, rough-awned, variety with a semi-lax spike (figure 1). The seeds are medium large in size, blue in color, and possess short-haired rachillas. This is an early maturing,

*Agronomists, Matanuska and Fairbanks Experiment Stations, Palmer and College, Alaska, respectively. The authors acknowledge the assistance of Dr. Zola M. Fineman, formerly Agronomist, Matanuska Experiment Station, who conducted the work at that Station during 1944-1947 and Mr. H. J. Hodgson, Head, Agronomy Department, Alaska Agricultural Experiment Station, who conducted the work at the Matanuska Station during 1948 and until September 1, 1949; and of Mr. John C. Brinsmade who assisted with the cereal investigations at the Fairbanks Station for the period reported. Special acknowledgement is due Dr. Allan D. Dickson, Barley and Malt Laboratory, Madison Wisconsin, for the malting data included in this circular; to the several members of the Agronomy Department of the Montana Agricultural Experiment Station, Bozeman, Montana, and the seed grower at Aberdeen, Idaho, for their help in increasing the seed of Edda barley for distribution to Alaskan growers; to the Grain Branch, Production Marketing Administration, U. S. D. A., Washington, D. C., for the reported nutritional analyses; and to the numerous Alaskan farmers and workers in government agencies who so splendidly cooperated in making the Uniform Alaska Cereal Trials a success.

**C. I. denotes the accession number of the Division of Cereal Crops and Diseases of the United States Department of Agriculture.

high yielding barley, exhibiting resistance to lodging. In comparison with Olli, to which it is most similar in appearance, Edda yields about 13 to 25 percent more grain per acre and is about 2 days later in maturity. In most other characters—straw strength, plant height, and bushel weight—the two varieties are about equal. Edda is susceptible to covered smut. No loose smut has been observed in nursery or field plantings of Edda in Alaska.



Figure 1. Left to right: Heads, seeds, and spikelets on a single rachis joint of Edda, Trapmar, and Olli barley.

LOCATION AND DESCRIPTION OF EXPERIMENTS

Edda has been compared with Olli and Trapmar barley in advanced yield trials since 1946 at the Agricultural Experiment Stations located near Palmer and College. Uniform Alaska Cereal Variety Trials were also conducted on farms throughout the Territory in 1950 with the cooperation of the Veterans On-the-Farm Training Program and the Agricultural Extension Agent at Palmer. The plot size and experimental design employed were those regularly accepted for this type of varietal evaluation. The number of replicates employed was four.

All plantings on Experiment Station land were made on spring-plowed land which had been cultivated for many years and the previous crop was either potatoes or oats and peas. Many of the cooperative Uniform Alaska Cereal Variety Trials throughout the Territory were on newly cleared land (See table 2).

Seeding rates per acre have varied some from year to year but were the same for all varieties in any one season. The lighter rates, or 1 1/2 bushels per acre, were used for comparative plantings in 1950, while in previous years 2 bushels per acre was the standard rate. A drill was used to sow nursery trials wherever possible; a few were seeded by hand.

AGRONOMIC PERFORMANCE

In discussing the agronomic performance of Edda, Olli, and Trapmar, data for grain yields, weight per bushel, date of maturity, plant height, lodging, and reaction to smut are treated separately. Table 1 gives a summary of all the results from tests conducted at the Experiment Stations during the years 1946-1950, while table 2 presents the 1950 yield and test weight data from the Uniform Alaska Cereal Variety Trials.

Trapmar and Olli are used as standards for comparison. Trapmar represented about 90 percent of the barley grown in Alaska in 1950. Olli accounted for about 5 percent of the acreage since it was only in 1950 that this variety was first recommended for growing in Alaska.

Grain yield determinations were made with Edda in advanced nursery trials over a 5-year period, 1946-1950. Yields for individual years at Palmer and College are given in table 1. At the Matanuska Station, Edda has consistently yielded more grain than Olli, the standard commercial hulled variety. For the 5 years it averaged 25 percent, or 10.6 bushels more grain per acre than Olli, and 16.4 bushels more than Trapmar. At College it averaged 39.5 bushels, while Olli yielded 34.9 bushels per acre. At both locations Trapmar yielded 13 percent less than Olli.

In the Uniform Alaska Cereal Trials on individual farms, the

TABLE 1. *Agronomic performance of Edda (New), and Olli and Trapmar (Old) barley in Experiment Station Nursery Yield Trials in Alaska, 1946-1950.*

Agronomic characteristics compared	Matanuska Station near Palmer			Fairbanks Station near College				
	Number of years	Edda	Olli	Trapmar	Number of years	Edda	Olli	Trapmar
Dates—1/10 headed	2	7-7	7-3	7-11	2	7-7	7-4	7-12
—fully headed	2	7-14	7-7	7-19	—	—	—	—
—ripe	3	8-16	8-14	8-24	5	8-5	8-3	8-14
Covered smut (percent infection)	1	9	0	11	—	—	—	—
Lodging (percent)	3	4	9	36	3	9	8	6
Plant height (inches)	2	43	40	51	3	35	38	39
Weight per bushel (pounds)	2	49.3	49.9	61.4	3	49.0	48.3	57.9
Grain yields (bushels) (a)	1946	49.3	34.6	34.0	1946	43.7	34.6	22.7
	1947	33.7	21.4	22.7	1947	19.2	23.1	21.2
	1948	62.6	51.2	49.8	1948	41.9	33.4	43.4
	1949	42.7	39.4	26.9	1949	57.4	54.5	37.3
	1950	80.3	69.0	53.2	1950	35.1	29.1	27.5
Average		53.7	43.1	37.3		39.5	34.9	30.4
Percent of Olli (Standard)		125	100	87		113	100	87

(a) Grain yields and comparisons are based on a 48-pound bushel.

superior yielding ability of Edda was again substantiated. Except at one location, it produced more grain than any other barley, having averaged 48.4 bushels per acre for the 14 locations (table 2). Olli and Trapmar yielded 13.3 and 23.8 bushels per acre less, respectively.

Weight per bushel data in tables 1 and 2 show that Edda is at least equal if not slightly superior to Olli. Both varieties have averaged above the 48-pound established standard for hulled barleys. Under Alaskan conditions, Edda can be expected to yield high quality grain in most years.

Date of maturity, as measured by dates the plants have headed or are ripe, is one of the most important factors in determining what variety should be grown in Alaska. At both College and Palmer, Edda was 2 days later in maturity than Olli—the earliest commercial variety grown in Alaska. Compared with Trapmar, Edda

TABLE 2. Grain yields and weights per bushel of Edda, Olli, and Trapmar barley grown in Uniform Alaska Cereal Trial in 1950.

Location of trial	Weight per bushel in pounds			Grain yield in bushels per acre (d)		
	Edda	Olli	Trapmar	Edda	Olli	Trapmar
Matanuska Valley						
Anchorage (a) (b) -----	45.6	32.2	17.8	—	—	—
Matanuska -----	82.1	72.0	44.8	50.8	48.4	62.3
Butte Area -----	115.9	99.3	56.4	53.0	51.4	61.3
Palmer (Lazy Mt.) (b) ---	40.3	28.8	7.3	49.0	46.0	—
Wasilla (b) -----	32.5	26.8	30.5	51.6	51.3	62.0
Swamp Lake (b) -----	35.3	42.7	34.3	49.0	47.5	60.4
Big Lake (b) -----	5.2	4.3	2.0	—	—	—
Knik (c) -----	56.6	28.4	32.0	50.7	49.9	62.7
Goose Bay (b) -----	12.9	5.5	12.8	—	—	—
Average -----	47.4	37.8	26.4	(e)51.0	(e)49.7	(e)61.8
Copper River Valley						
Gakona (a) -----	36.2	32.2	14.5	—	—	—
Tanana Valley						
College — Uplands -----	34.5	24.0	16.4	49.8	50.5	60.0
College — Bottomlands ---	56.8	33.3	38.3	52.5	50.0	57.8
Salcha Creek (b) -----	41.6	28.4	37.4	52.8	52.0	61.0
Average -----	44.3	28.6	30.7	51.7	50.8	59.6
Kenai Peninsula						
Soldotna -----	81.6	33.3	(f)	49.5	50.1	(f)
Average of all locations ---	48.4	35.1	24.6	(g)51.3	(g)50.1	(g)61.0

(a) Only one replication harvested for yield determinations.

(b) Plantings were on newly cleared land.

(c) Planted on newly cleared regrowth, land previously cultivated.

(d) Calculations based on 48 pounds per bushel.

(e) Lazy Mountain not included in average.

(f) Complete failure due to late maturity, severe lodging and mice damage.

(g) Lazy Mountain and Soldotna not included in average.

is earlier in maturity by more than a week (table 1). In the present agricultural areas of Alaska where grain production appears promising, Edda should mature satisfactorily.

Plant height of Edda has been generally acceptable in all observed plantings. For comparable years, Edda grew about 43 inches tall, or 3 inches higher than Olli at Matanuska; while at College, Olli was taller than Edda by that same amount. Trapmar, under normal conditions, grows taller than either variety (table 1).

Lodging has been generally more severe at the Matanuska Station than at College. At the Matanuska Station, Edda stood up well, having lodged only 4 percent during the last 3 years. In the same tests, Olli lodged 9 percent and Trapmar, known to be relatively weak-strawed, averaged 36 percent. Little or no differential lodging among varieties occurred at College.

Reaction to smut studies were made at the Matanuska Station in 1950. Covered smut, *Ustilago hordei* (Pers.) Lagerh., infections in 1950 were obtained by artificially inoculating hand dehulled seed with a composite of spores collected from various barley varieties growing in the Matanuska and Tanana Valleys in 1949. Edda and Trapmar were susceptible to these covered smuts, having averaged 9 and 11 percent of the heads smutted (table 1). In contrast, Olli was entirely free of smut. Trapmar has been observed to be highly susceptible to loose smut, *U. nuda* (Jens.) Rostr. and to black or semi-loose smut, *U. nigra* Tapke. No infected heads of this type of smut have been observed in seed stocks of either Edda or Olli that have been growing in Alaska for some time.

Although covered smut is probably the most destructive disease affecting barley in Alaska, it can be readily controlled by externally treating the seed before planting. Mercurial seed disinfectants, when applied as recommended by the manufacturer, should control both covered and black loose smut in barley.

MALTING QUALITY

Malting tests of Edda grown at College and Palmer in 1949 and 1950 were made by the U. S. Barley and Malt Laboratory at Madison, Wisconsin. Based on 2 years' tests, Edda was found to be better than Olli, which is recognized as one of the good malting varieties when grown in the more northern areas where it is adapted. Malts from Edda barley grown at the Matanuska Station were very high in extract for 6-rowed barleys and unusually high in alpha-amylase activity. Therefore, malt from Edda might be utilized in blending to bring up malt deficiencies of other barley varieties. The seasonal effect upon quality, while fairly high for some factors, did not change the ranking of the two varieties.

Pilot plant malting and brewing studies (small-scale runs) are being continued with the 1950 samples from Alaska by the Barley

and Malt Laboratory. Results of these tests are not available for this report.

FEEDING VALUE

Actual feeding trials using Edda have not yet been conducted in Alaska. Chemical analyses, however, have been made on it and certain other Alaska-grown barleys by the United States Department of Agriculture (Grain Branch, Production and Marketing Administration, Washington, D. C.). The chemical compositions of Edda, Olli, and Trapmar for the years 1949 and 1950 are reported in table 3. All determinations reported are on a moisture-free basis. The results in general are encouraging, since all three Alaska-grown barleys were equal to or higher than Stateside barleys* in percent protein, nitrogen-free extract, and total digestible nutrients, but slightly lower in crude fat, ash, and crude fiber. For the years tested, Edda and Olli, both hulled varieties, were about equal in composition, differing only by 0.33 percent in protein, 0.05 percent in ash, and 0.80 percent in nitrogen-free extract. The total digestible nutrient composition of Edda for the four Station-years was 88.06 percent. For the same period Olli averaged 88.00 percent and Trapmar, the hulless variety, ran 89.8 percent for the same factor. For comparative purposes, Morrison lists common barley in the United States, not including Pacific Coast States, as having 86.97 percent total digestible nutrients. Barley from the Pacific Coast States averages 87.66 percent, while hulless or naked barley showed an analysis of 89.19 percent total digestible nutrients in the States.

The analytical data presented in table 3 indicate that Edda should be entirely acceptable as a feed barley.

* Morrison, F. B. Feeds and feeding. pp. 1114-1115. The Morrison Publishing Co., Ithaca, N. Y. 1949.

TABLE 3. *Nutritional analyses on Edda, Olli, and Trapmar barley from yield trials at College and Palmer, Alaska, with United States determinations for comparison (a).*

Kind of barley	Location grown	Year	Percentage composition (c)					Total digestible nutrients (e)
			Protein (d)	Crude fiber	Crude fat	Ash	Nitrogen-free extract e/	
Hulled Type								
Edda	Palmer	1949	10.5	4.7	1.8	3.0	80.0	87.77
		1950	8.9	4.3	2.0	2.3	82.5	88.94
	Average		9.70	4.50	1.90	2.65	81.25	88.36
College	College	1949	14.7	5.4	1.9	2.9	75.1	87.14
		1950	13.8	4.3	2.1	2.3	77.5	88.39
	Average		14.25	4.85	2.00	2.60	76.30	87.77
Olli	Palmer	1949	11.3	4.8	2.0	2.9	79.0	87.90
		1950	10.2	4.7	2.0	2.5	80.6	88.44
	Average		10.75	4.75	2.00	2.70	79.80	88.17
College	College	1949	13.9	5.2	1.8	3.0	76.1	87.14
		1950	13.8	4.0	2.1	2.3	77.8	88.50
	Average		13.85	4.60	1.95	2.65	76.95	87.82
	U. S. common, excluding Pacific Coast States (b)		14.21	6.04	2.13	3.13	74.49	86.97
	U. S. common, Pacific Coast States (b)		9.69	6.35	2.12	2.90	78.94	87.66
Hulless Type								
Trapmar	Palmer	1949	12.8	2.5	1.6	2.0	81.1	89.00
		1950	11.0	2.0	2.0	1.9	83.1	89.86
	Average		11.90	2.25	1.80	1.95	82.10	89.43
College	College	1949	16.4	2.4	2.2	2.2	76.8	88.92
		1950	13.9	2.1	2.0	1.7	80.3	89.64
	Average		15.15	2.25	2.10	1.95	78.55	89.28
	U. S. common, hulless (b)		12.86	2.66	2.22	2.33	79.93	89.19

(a) Analyses of Alaskan grains made by Grain Branch, Production and Marketing Administration, U. S. Department of Agriculture.

(b) Morrison, F. B. Feeds and feeding. pp. 1114-1115. The Morrison Publishing Co., Ithaca, N. Y. 1949.

(c) All values are on a moisture-free basis.

(d) N x 6.25.

(e) Calculated values.