Note on the Quality Characteristics of Indian Ricegrass (Wye)[1]

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Indian ricegrass (*Oryzopsis hymenoides* (Roem. and Schult.) Richer) is a native perennial bunchgrass widely distributed throughout the western United States, southern Canada, and Mexico. The plant displays wide variation in growth habit, leaf type, and size and shape of seeds. The seeds mature in early summer and are plump, black or brown, and round to oblong. Plant differences have been shown to be inherent within the geographic strain (Bohmont 1956, Plummer and Frischknecht 1952, Plummer et al 1955, Robertson 1976).

In 1978, 'Nezpar' Indian ricegrass was released by the USDA-SCS Aberdeen Plant Materials Center and the Idaho Agricultural Experiment Station for use in range and critical area revegetation. Under irrigated field conditions at Aberdeen, cleaned seed yield averaged 376 lb/acre (421.1 kg/ha) on fine sandy loam soil (Booth et al 1979). A research group at New Mexico State University is increasing the seed yield of Indian ricegrass. The yields of eight selections evaluated since 1972 ranged from 124 to 142% of the check variety and are being used to develop a new cultivar (Quinones[4]).

Interest in the milling and baking properties of Indian ricegrass was stimulated by the fact that it is a perennial crop and little is known of its quality characteristics. Indian ricegrass was a widely known food plant of Indian peoples, particularly for tribes in the Southwest and in the Great Basin (USDA-FS 1937 citing Stevenson 1915, Reed 1962). It was known as wye or wai (pronounced "why") to the Paiute, Shoshone, and Ute Indians. Fowler (1976) describes their method of harvest and preparation and relates that the nutritious wye mush had a pleasing, nutlike flavor. Yanovsky and Kingsbury (1938), reporting incomplete analyses, found that seeds of Indian ricegrass from New Mexico contained 10% moisture, 5.8% sugar, 18.7% starch, and 2.6% ash. Seeds in North Dakota were found to contain 2.34% oil (Fendall 1964). This note reports findings on the quality characteristics of one recently released variety of Indian ricegrass, Nezpar.

MATERIALS AND METHODS

The sample of Nezpar Indian ricegrass was harvested in 1977 at the University of Idaho Research and Extension Center, Aberdeen. The seed was put through a Quaker Oats experimental impact dehuller twice and then through a Clipper cleaner, using a No. 7 (2 mm) for the large screen and a No. 1/15 (1 mm) for the small screen.

The hulled Indian ricegrass was tempered to 14% moisture and held for 16 hr before being milled on a Brabender Quadrumat Senior experimental mill. The flour was rebolted over a No. 100 Tyler USA standard testing sieve (150 μm). The percent flour yield was calculated on a percent total product basis. Test weight, protein, moisture, ash, and mixograph determinations were made by AACC approved methods (1961). Amino acid content was determined using a Dionex amino acid analyzer kit MBN/SS with ninhydron detection (Dionex Corp., Sunnyvale, CA 94086).

Indian ricegrass flour was added to a standard hard red wheat bread flour (11.8% protein), replacing it at rates of 0, 5, 10, 15, and 20%. Bread was made from these samples, using a straight-dough baking procedure described by Finney and Barmore (1945). Cookies were baked with 100% Indian ricegrass flour and with a standard soft white wheat flour, using the micro method III described by Finney et al (1950).

TABLE I
Nezpar—Indian Rice Grass[a]

	Test Weight	Flour Yield (%)	Moisture (%)	Protein[b,c] (%)	Ash[b] (%)
Grain	64.0	···	9.25	16.8	1.22
Flour	···	77.7	13.6	16.5	0.68

[a]All values are averages of three determinations.
[b]14% moisture basis.
[c]N × 6.25.

TABLE II
Amino Acid Analysis of Nezpar Seed[a]

Amino Acid	Percent
Aspartic acid	9.04
Threonine	3.68
Serine	5.08
Glutamic acid	18.27
Proline	5.18
Glycine	5.14
Alanine	7.50
Valine	3.50
Methionine	2.12
Isoleucine	2.79
Leucine	7.87
Tyrosine	4.69
Phenylalanine	5.83
Histidine	3.85
Lysine	3.18
Ammonia	1.72
Arginine	9.27

[a]Reported as grams of amino acid per 100 g of protein.

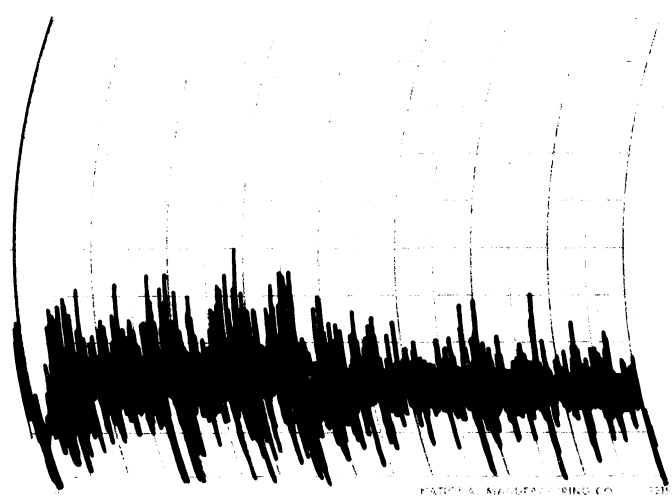

Fig. 1. Mixogram of 100% Nezpar flour—72% absorption, 16.5% protein, 14% mb.

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[4]A. F. Quinones. 1979. Personal communication.

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TABLE III
Baking Results[a]

Nezpar Flour (%)	Dough Type at Pan[b]	Loaf Volume (cc)
0	S	992
5	S−	950
10	I+	923
15	I+	870
20	I	838

[a]All values are averages of three separate bakes.
[b]S = above average dough strength, I = average dough strength.

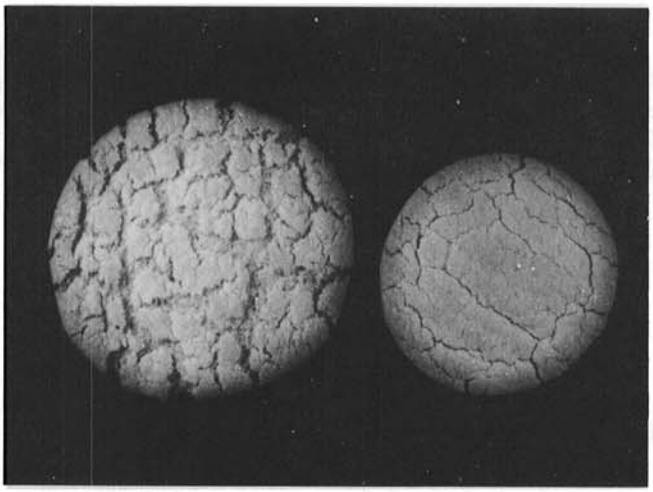

Fig. 2. Cookies baked with a soft white wheat flour (**left**) and with Nezpar flour (**right**).

RESULTS AND DISCUSSION

Hulled Nezpar seed was tan and shaped like a miniature wheat kernel with very vitreous characteristics. Several kernels lost their germs during the dehulling procedure. The Nezpar grain protein and ash results reported in Table I and the amino acid content reported in Table II may have been affected by this partial loss of germ, but the extent was not determined. Nezpar showed a good test weight, high milling yield, and high flour protein content. The Nezpar flour was a cream color and displayed a "sharp feel" more like that of hard wheat flour than of soft wheat flour. The bran from Nezpar was fine, with much of it being ground into shorts, although optimum milling conditions for Nezpar have not been developed. The shorts contained a noticeable amount of unground endosperm, which further emphasizes the vitreous nature of this seed. Nezpar flour showed a poor baking response. Its mixing curve was not typical of a good baking hard wheat (Fig. 1). As the percent of Nezpar flour was increased in the bread formula, the dough became weaker and the loaf volume decreased (Table III). The cookie spread of the Nezpar flour was 6.9 cm compared to a spread of 8.8 cm for the soft white wheat flour control (Fig. 2).

Although Indian ricegrass was once a staple food of Indian people, its poor baking quality eliminates consideration of its use in domestic bakery products. The fact that Nezpar is a perennial grass eliminates costly seedbed preparation and planting on a yearly basis. If seed yields can be increased and the current protein content maintained, Indian ricegrass's adaptability might make it a candidate for a perennial feed grain in critical growth areas or rangelands.

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