

Project 08I210
Project Report - 1996
by Carrie Winn, UCEPC Mgr.

Initial Evaluation of Indian Ricegrass (*Oryzopsis hymenoides*) for Heavy Soils

INTRODUCTION:

Indian ricegrass (*Oryzopsis hymenoides*) is a native cool-season bunchgrass that is often a major stand component of harsher, sandy sites throughout the western United States from North Dakota to Washington and south to California and Texas. While the species is best adapted to dry, sandy soils, it can also be found on clayey, silty, and shaley sites. It does well on Southern exposures, especially at higher elevations. Indian ricegrass is found in the 6 to 12 inch precipitation zone at elevations ranging from 2,000 to 10,000 feet. Stands tend to be short-lived (3 to 4 years) and reproduction is primarily from seed. It is very drought tolerant and is often a pioneer species on open or disturbed sites. It tends not to compete well with other perennial grasses. Indian ricegrass tolerates weakly saline or alkaline soils, but does best under more mesic conditions. The species tends to tolerate shade and high water tables poorly.

Indian ricegrass is highly palatable and serves to provide nutritious forage for wildlife and livestock under harsh site conditions. It also has strong potential for use with mined land reclamation, critical area stabilization, and as a standing winter seed.

OBJECTIVE:

Past releases of Indian ricegrass ('Nezpar' and 'Paloma') are solely adapted to light to medium textured soils. As a consequence of its good nutrition, palatability, and establishment characteristics on critical areas, there is a need for a cultivar of Indian ricegrass that is adapted to heavier soil types.

METHODS:

In 1988 collections of Indian ricegrass ecotypes from heavy soils were made in Colorado, Wyoming, Utah and Nevada (see list 1). These collections were cleaned by the Center and placed in storage prior to planting in 1991. On July 12, 1991, fifty-five accessions of ricegrass were seeded into rod rows in UCEPC field 25. While two rod rows were planted for most accessions, several accessions only had enough seed for a single row. The established rows were 15 feet long with three feet between rows. The seedbed was prepared by discing and rotary hoeing with beds being formed with a bed-shaper. Seeding was completed using a Vbelt seeder, with thirty to forty seeds per foot of row being planted. Irrigation using a hand-moved sprinkler system applied enough water to germinate seed and supply moisture for the first growing season. The planting has been maintained as dryland from that time. (See attached accession list - List 1.)

RESULTS:

The planting was evaluated seasonally from establishment in 1991 through the 1995 field season for seedhead abundance, percent stand, height (cm.), width (cm.), vigor, and uniformity. At the conclusion of the 1995 field season, twelve accessions were noted for superiority.

9024664 (Moffat County)	9024715 (Colorado Springs, CO)
9024751 (Colorado Springs, CO)	9024741 (Pagosa Springs, CO)
9024672 (Green River, UT)	9024727 (Grand Junction, CO)
9024749 (Durango, CO)	9024739 (Pagosa Springs, CO)
9024721 (Trinidad, CO)	9024735 (Grand Junction, CO)
9024716 (Colorado Springs, CO)	9024723 (Trinidad, CO)

Accessions 9024716 (Colorado Springs), 9024751 (Colorado Springs), 9024715 (Colorado Springs), 9024739 (Pagosa Springs), and 9024741 (Pagosa Springs) performed especially well for all years.

In comparison, the two standards - 'Nezpar' and 'Paloma' both started off well in 1991 and 1992, then began to show medium to medium-poor performance from 1993 through 1995. Both 'Nezpar' and 'Paloma' performed their poorest during the very wet summer of 1993. Performance for both cultivars was much more average during more typical years.

According to Dr. Tom Jones, ARS, Logan, while Indian ricegrass can interbreed, under Northwestern Colorado ambient weather conditions, it is highly unlikely (floret anthers tend to wither upon emergence). As consequence, Indian ricegrass is a facultative cleistogamous species (self-pollinated or true-to-type). Accordingly, seed can be harvested directly from superior accessions without fear of contamination from adjacent accessions. As result, seed was collected in 1995 from the twelve accessions noted as superior plus the two standards - 'Nezpar' and 'Paloma'. After seed cleaning, the twelve superior accessions plus Nezpar and Paloma will be placed in advanced evaluations.

After consultation with Dr. Jones, the UCEPC should place its superior accessions in at least three off center evaluations while initiating forage analysis in the existing planting on center. Under advanced evaluation, the twelve superior accessions plus the two standards should be analyzed for seed yield, forage analysis, seed polymorphism, seed dormancy, germination, vigor, survival, plant dimension, and reaction to growing season (onset of growth and dormancy). Because persistence under field conditions is an important criterion, advanced evaluation should continue for at least five years.

List 1. Indian Ricegrass Collections for Heavy Soils.

	Accession	Collection Site		Accession	Collection Site
1.	9024664	Moffat Co., Co	29.	9024752	Utah
2.	9024747	Durango, CO	30.	9024742	Grand Co., UT
3.	9024732	Grand Junction, CO	31.	9024731	Delta Co., Co
4.	9024701	Rio Blanco Co., CO	32.	9024660	Delta Co., Co
5.	9024750	Durango, CO	33.	9024719	Walsenburg, Co
6.	9024729	Grand Junction, CO	34.	9024741	Pagosa, CO
7.	9024722	Trinidad, Co	35.	9024730	Grand Junction, Co
8.	9024672	Green River, UT	36.	9024666	Parachute, CO
9.	9024749	Durango, CO	37.	9024814	Delta, Co

10.	9024728	Grand Junction, CO	38.	9024740	Pagosa, CO
11.	9024733	Grand Junction, CO	39.	9024724	Pueblo, CO
12.	9024717	Hugo, CO	40.	9024724	Colorado
13.	9024736	Durango, CO	41.	40231	Rio Blanco Co., CO
14.	9024755	Tonopah, NV	42.	9024738	Pagosa, CO
15.	9024721	Trinidad, Co	43.	9024736	Grand Junction, Co
16.	9024716	Colorado Springs, CO	44.	9024661	Delta Co., CO
17.	9024748	Durango, CO	45.	9024727	Grand Junction, CO
18.	9024745	Grand Junction, CO	46.	9024739	Pagosa, CO
19.	9024720	Craig, CO	47.	9024735	Grand Junction, CO
20.	9024715	Colorado Springs, Co	48.	9024737	Pagosa Springs, CO
21.	9024751	Colorado Springs, CO	49.	9024726	Grand Junction, Co
22.	9024744	Grand Junction, Co	50.	9024725	Grand Junction, CO
23.	9024718	Canon City, CO	51.	9024756	Alamosa, Co
24.	9024654	Fremont Co., CO	52.	9024723	Trinidad, Co
25.	9024753	Grand Junction, CO	53.	9024734	Grand Junction, Co
26.	9024743	Grand Junction, CO	54.	Nezpar	Whitebird, ID
27.	9024818	unknown	55.	Paloma	Pueblo, CO
28.	9024714	Colorado Springs, CO			

Table 1. 1991 Evaluation for 08I210 Indian Ricegrass for Heavy Soils.

Row	Accession	% Stand	Height (cm)	Width (cm)	Vigor	Flower Abund.	Rel. Rank
1	9024664	2	8	-	6	-	-
	9024747	2	9	-	6	-	-
	9024732	2	10	-	6	-	-
	9024734	0	-	-	-	-	-
2	9024701	0	-	-	-	-	-
	9024750	2	8	-	6	-	-
	9024729	1	12	-	5	-	-
	9024722	0	-	-	-	-	-
3	9024672	30	12	-	4	-	-
	9024749	20	9	-	5	-	-
	9024728	2	9	-	7	-	-
	9024733	5	13	-	4	-	-
4	9024717	0	-	-	-	-	-
	9024746	1	8	-	7	-	-
	9024755	0	-	-	-	-	-
	9024721	30	13	-	4	-	-
5	9024716	1	12	-	6	-	-
	9024748	3	9	-	6	-	-
	9024745	0	-	-	-	-	-
	9024720	8	10	-	-	-	-

6	9024715	1	8	-	6	-	-
	9024751	0	-	-	-	-	-
	9024744	35	13	-	3	-	-
	9024718	1	10	-	6	-	-
7	9024654	1	9	-	6	-	-
	9024753	35	16	-	2	-	-
	9024743	38	15	-	2	-	-
	9024818	40	13	-	2	-	-
8	9024714	20	8	-	6	-	-
	9024752	1	4	-	8	-	-
	9024742	16	12	-	5	-	-
	9024731	25	13	-	4	-	-
9	9024660	48	13	-	2	-	-
	9024719	1	6	-	8	-	-
	9024741	< 0	6	-	9	-	-
	9024730	0	-	-	-	-	-
10	9024666	0	-	-	-	-	-
	9024814	2	8	-	7	-	-
	9024740	0	-	-	-	-	-
	9024724	0	-	-	-	-	-
11	9024925	2	10	-	5	-	-
	40231	1	8	-	6	-	-
	9024738	< 0	3	-	8	-	-
	9024736	1	10	-	5	-	-
12	9024661	12	12	-	4	-	-
	9024727	75	15	-	1	-	2
	9024739	22	12	-	4	-	-
	9024735	1	9	-	7	-	-
13	9024737	1	9	-	7	-	-
	9024726	1	10	-	6	-	-
	9024725	1	7	-	8	-	-
	9024756	2	10	-	4	-	-
14	9024723	< 0	5	-	8	-	-
	Paloma	80	12	-	2	-	3
	Nezpar	85	13	-	1	-	1

Table 2. 1992 Evaluation for 08I210 Indian Ricegrass for Heavy Soils.

Row	Accession	% Stand	Height (cm)	Width (cm)	Vigor	Flower Adund.	Unif.	Rel. Rank
1	9024664	75	61	6	5	-	4	-
	9024747	60	58	5	5	-	5	-
	9024732	70	38	5	6	-	5	-
	9024734	60	34	6	6	-	6	-
2	9024701	70	37	4	5	-	5	-
	9024750	85	45	5	5	-	6	-

	9024729	80	42	5	6	-	4	-
	9024722	20	30	4	7	-	5	-
3	9024672	90	58	7	3	-	3	3
	9024749	50	45	5	4	-	4	-
	9024728	60	40	5	6	-	6	-
	9024733	85	41	4	6	-	6	-
4	9024717	5	36	5	7	-	5	-
	9024746	55	45	5	6	-	5	-
	9024755	5	56	6	7	-	4	-
	9024721	90	57	6	5	-	5	-
5	9024716	95	60	5	4	-	3	-
	9024748	90	47	4	5	-	6	-
	9024745	3	33	3	7	-	6	-
	9024720	60	35	3	5	-	6	-
6	9024715	85	63	4	4	-	3	-
	9024751	80	26	5	5	-	3	-
	9024744	90	53	5	4	-	4	-
	9024718	70	45	3	5	-	6	-
7	9024654	75	60	6	4	-	5	-
	9024753	75	58	6	3	-	2	5
	9024743	90	50	6	5	-	5	-
	9024818	85	59	6	5	-	5	4
8	9024714	85	50	5	5	-	5	-
	9024752	45	45	5	6	-	6	-
	9024742	65	43	4	5	-	6	-
	9024731	75	57	8	3	-	3	-
9	9024660	70	42	5	3	-	2	-
	9024719	80	50	4	5	-	5	-
	9024741	80	46	5	5	-	5	-
	9024730	0	-	-	-	-	-	-
10	9024666	50	47	6	6	-	4	-
	9024814	55	38	4	5	-	5	-
	9024740	45	50	5	6	-	3	-
	9024724	0	-	-	-	-	-	-
11	9024925	25	53	7	4	-	5	-
	40231	15	52	7	5	-	6	-
	9024738	70	48	4	6	-	6	-
	9024736	65	44	5	5	-	5	-
12	9024661	65	40	5	6	-	5	-
	9024727	70	54	6	4	-	5	2
	9024739	80	36	5	4	-	5	-
	9024735	90	54	4	5	-	5	-
13	9024737	70	54	4	5	-	5	-
	9024726	45	48	4	6	-	6	-
	9024725	50	33	3	7	-	6	-

	9024756	65	41	4	5	-	5	-
14	9024723	90	62	4	5	-	4	-
	Paloma	95	52	6	3	-	4	2
	Nezpar	95	80	6	2	-	3	1

Table 3. 1993 Evaluation for 08I210 Indian Ricegrass for Heavy Soils.

Row	Accession	%	Height	Width	Vigor	Flower		Rel.
		Stand	(cm)	h (cm)		Adund.	Unif.	Rank
1	9024664	85	71	73	2.5	2.5	3	4
	9024747	65	68	68	4	4	4	21
	9024732	62	41	41	5.5	5.5	3	45
	9024734	55	66	77	4	4	4	26
2	9024701	55	48	44	5	4.5	4	40
	9024750	80	63	75	3	3.5	3	12
	9024729	65	45	35	5.5	5	4	44
	9024722	15	48	51	4.5	4.5	4	42
3	9024672	75	58	68	4	3.5	4	17
	9024749	85	69	82	3	3	3	8
	9024728	70	42	50	4	4	4	20
	9024733	65	54	50	4.5	4	5	27
4	9024717	5	38	65	5	5	5	52
	9024746	50	69	85	4	4	6	30
	9024755	10	58	63	4	3	4	41
	9024721	85	67	59	3	3	5	9
5	9024716	87	73	82	2	2	3	1
	9024748	80	69	87	3	3	3	10
	9024745	15	42	70	5	5	6	51
	9024720	60	38	47	4	4	4	25
6	9024715	80	72	75	2.5	3	3	3
	9024751	80	69	82	2	2	2	2
	9024744	40	47	54	6	5	5	50
	9024718	65	52	41	4	4	4	22
7	9024654	70	59	71	3	3	3	15
	9024753	70	52	68	5	4	4	37
	9024743	70	44	40	5	5	4	38
	9024818	75	59	47	4	4	3	18
8	9024714	85	61	84	3	3	2	10
	9024752	35	44	55	4	4	3	35
	9024742	60	52	61	4	4	5	24
	9024731	50	33	52	6	5	3	48
9	9024660	55	46	61	4.5	4	4	34
	9024719	60	50	58	4.5	4	5	32
	9024741	65	77	94	2.5	2	2	7
	9024730	0	-	-	-	-	-	-

10	9024666	55	50	76	4	3.5	6	39
	9024814	45	45	75	5	5	5	43
	9024740	40	52	98	3.5	3	3	17
	9024724	0	-	-	-	-	-	-
11	9024925	30	51	76	5	4	6	49
	40231	30	50	57	4	4	5	36
	9024738	70	58	73	3	3	3	15
	9024736	70	52	53	4	4	4	19
12	9024661	55	31	53	6	6	4	47
	9024727	60	58	59	4.5	5	4	31
	9024739	85	53	81	2.5	3	2	6
	9024735	85	60	68	2.5	2	3	5
13	9024737	75	61	94	3	3	3	14
	9024726	55	42	57	4	4	4	29
	9024725	65	50	60	4	4	3	23
	9024756	55	45	52	5	5	4	38
14	9024723	80	53	75	3	2.5	3	13
	Paloma	55	52	53	5.5	5.5	4	46
	Nezpar	55	68	74	4.5	4	5	33

Table 4. 1994 Evaluation for 08I210 Indian Ricegrass for Heavy Soils.

Row	Accession	% Stand	Height (cm)	Width (cm)	Vigor	Flower Adund.	Unif.	Rel. Rank
1	9024664	85	43	48	3	3	3	5
	9024747	60	46	49	4.5	4	4.5	22
	9024732	55	38	32	6	6	5	43
	9024734	60	37	36	3.5	4	4	18
2	9024701	45	27	41	7	7	5	49
	9024750	75	40	42	4	4	3	13
	9024729	60	29	34	5.5	5	4	36
	9024722	10	20	50	5.5	5	4	51
3	9024672	75	42	38	4	4	5	15
	9024749	85	35	38	4	4	3	12
	9024728	70	34	50	5	4.5	4	28
	9024733	60	32	33	5.5	4.5	5	35
4	9024717	5	39	45	5.5	5	5	52
	9024746	55	34	50	4.5	4.5	6	31
	9024755	10	36	55	3.5	3	4	41
	9024721	85	40	60	3	3	5	6
5	9024716	87	43	54	2.5	2.5	3	1
	9024748	80	34	51	3	3.5	3	9
	9024745	10	30	43	4.5	4	6	48
	9024720	55	24	32	4.5	4.5	4	30

6	9024715	80	34	38	3	3	3	8
	9024751	80	33	39	3	3.5	3	10
	9024744	33	30	48	6	6	5.5	47
	9024718	60	36	53	4.5	4.5	4	23
7	9024654	70	35	53	4	3.5	3	16
	9024753	60	33	40	5.5	6	4	37
	9024743	60	24	38	6	7	4	42
	9024818	70	38	43	4.5	4.5	4	19
8	9024714	85	33	53	3.5	3.5	3	11
	9024752	35	32	49	5	5	3.5	45
	9024742	60	33	50	4.5	4.5	5	26
	9024731	45	36	49	6	5.5	4	46
9	9024660	55	36	48	5	5	4	34
	9024719	60	39	51	4.5	4	5	29
	9024741	70	40	45	2.5	2.5	2	3
	9024730	0	-	-	-	-	-	-
10	9024666	50	34	48	4	3.5	6	27
	9024814	40	36	38	6	6	5	47
	9024740	40	35	57	4	3.5	3	32
	9024724	0	-	-	-	-	-	-
11	9024925	25	37	51	4.5	4.5	6	44
	40231	30	36	44	4	4	5	38
	9024738	70	34	53	4	4	3	17
	9024736	65	35	44	4.5	4.5	4	21
12	9024661	45	24	36	7.5	7	4	50
	9024727	60	31	48	4.5	5	4	24
	9024739	85	32	51	3	3	2	4
	9024735	85	38	55	2.5	2.5	2	2
13	9024737	75	35	48	4	4	3	14
	9024726	55	23	31	5.5	6	4	40
	9024725	55	29	48	5.5	6	4	39
	9024756	55	34	51	5	5	4	33
14	9024723	80	42	48	3	3	3	7
	Paloma	65	32	42	4.5	4	4	20
	Nezpar	60	37	48	4.5	4.5	5	25

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Table 5. 1995 Evaluation for 08I210 Indian Ricegrass for Heavy Soils.

Row	Accession	% Stand	Height (cm)	Width (cm)	Vigor	Flower Adund.	Unif.	Rel. Rank
1	9024664	70	53	80	3.5	3.5	4	13
	9024747	50	72	73	3	4	6	16
	9024732	33	45	60	6	6	7	39

	9024734	45	48	95	5	5	5	32
2	9024701	15	45	55	8	6	3	51
	9024750	75	60	95	3.5	4	3	10
	9024729	40	42	50	6	6	3	40
	9024722	10	46	52	6	7	6	48
3	9024672	80	50	80	2.5	3	3	3
	9024749	80	70	85	2.5	4	4	9
	9024728	60	40	65	5	6	5	30
	9024733	45	45	30	7	7	6	46
4	9024717	20	55	70	5	4	6	36
	9024746	50	57	90	4.5	5	6	27
	9024755	25	50	75	3.5	2	2	34
	9024721	75	53	60	3.5	3	3	11
5	9024716	85	60	60	2.5	2.5	4	2
	9024748	70	65	70	3.5	4	5	14
	9024745	10	50	60	5	7	5	37
	9024720	30	40	48	6	6	6.5	43
6	9024715	70	65	70	3	3	3	6
	9024751	70	60	85	3	2.5	4	7
	9024744	25	40	60	6	6	6	44
	9024718	65	45	55	5	4	5	29
7	9024654	65	63	80	3	3	3	8
	9024753	60	54	76	4	5	6	22
	9024743	40	40	50	6	5	6	41
	9024818	50	45	70	5	5	6	31
8	9024714	60	55	70	3.5	4	4	17
	9024752	35	40	50	4.5	6	6	33
	9024742	55	48	50	4	5	5	23
	9024731	15	50	50	6	6	7	47
9	9024660	25	35	38	8	5	8	50
	9024719	65	65	80	4	4	3.5	20
	9024741	75	80	90	2	3	2	1
	9024730	0	-	-	-	-	-	-
10	9024666	55	65	90	3	3	6	15
	9024814	35	40	40	6	6	5	42
	9024740	35	55	80	3.5	3.5	6	25
	9024724	0	-	-	-	-	-	-
11	9024925	25	50	65	4	4	6	35
	40231	40	60	70	3	5	6	18
	9024738	70	58	84	4	4	3	19
	9024736	65	53	52	5	4	6	28
12	9024661	10	35	25	8	7	5	52
	9024727	60	45	45	5	5	5	29
	9024739	85	50	75	3	3	2	5
	9024735	75	50	45	3.5	4	3.5	12

13	9024737	65	50	70	4	4.5	4	21
	9024726	45	45	30	6	6	6	38
	9024725	25	35	38	8	7	6	49
	9024756	40	35	50	6	6	6	41
14	9024723	80	55	75	2.5	3	5	4
	Paloma	70	35	40	4.5	5	5	26
	Nezpar	50	65	70	4	4	6	24

Table 6. 1996 Evaluation for 08I210 Indian Ricegrass for Heavy Soils.

Row	Accession	% Stand	Height (cm)	Width (cm)	Vigor	Flower Adund.	Unif.	Rel. Rank
1	9024664	80	60	50	3	3	4	13
3	9024672	70	65	55	3	3	4	3
	9024749	75	60	75	3	3	3	9
4	9024721	70	55	65	3	3	3	11
5	9024716	85	50	65	3	2.5	3	2
6	9024715	75	60	80	3	2.5	3	6
	9024751	70	55	80	3	2.5	3	7
12	9024739	80	45	70	3	3	3	5
	9024735	75	50	70	3	3	3.5	12
14	9024723	70	50	70	2.5	3	4	4