Bulletin 300 October, 1958

RAMONA 50 AND ONAS 53 WHEAT

Field of Ramona 50 Wheat in the Salt River Valley

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARIZONA, TUCSON

CONTENTS

RAMONA 50 AND ONAS 53 WHEAT

By

A. D. Day [1]

RECOMMENDED USE IN ARIZONA

Ramona 50 wheat is recommended for "milling purposes" in the irrigated areas of Arizona. Onas 53 wheat is recommended for "livestock feed" in the irrigated areas of Arizona. When wheat is grown, Onas 53 also is suggested for winter pasture, green chopped feed, and hay production. The recommendations given in this bulletin are based primarily upon the results from yield tests conducted at Yuma, Mesa, Cortaro, Tucson, and Safford, Arizona. In using this information, it should be remembered that local environmental conditions may change the wheat growing recommendations for specific areas in Arizona.

Ramona 50 and Onas 53 are two new wheat varieties recommended for the irrigated areas of Arizona. Ramona 50 is an improved form of Ramona, and Onas 53 is an improved form of Awned Onas. This bulletin was prepared to give the history, agronomic characteristics, milling characteristics, baking characteristics, and plant characteristics of these new wheat varieties. It is hoped that the material presented will help farmers choose between Ramona 50 and Onas 53 for specific uses in Arizona.

HISTORY

Ramona 50 wheat was developed at Davis, California in a backcrossing program of the California Agricultural Experiment Station and the U.S. Department of Agriculture. The history of Ramona 50 wheat is as follows: Hard Federation was crossed with Bunyip to produce Ramona, which was released in California in 1935. White Federation 38 was backcrossed to Ramona for three generations to produce Ramona 44, which

[1] Associate Agronomist, Department of Agronomy, Arizona Agricultural Experiment Station, Tucson, Arizona. The author gratefully acknowledges the valuable assistance of the following personnel in conducting the Ramona 50 and Onas 53 wheat variety tests: D. C. Aepli and R. K. Thompson, Mesa Experiment Station; Frank Pritchard and H. J. Czajkowski, Yuma Experiment Station; L. C. Chapman and J. N. Davis, Safford Experiment Station; E. H. Hussmann and G. D. Massey, Tucson Experiment Station; and A. S. Oshrin, Cortaro, Arizona. Appreciation is extended to General Mills, Inc., San Francisco, California for conducting the milling and baking quality tests. Portions of the general information regarding the history and characteristics of Ramona 50 and Onas 53 wheat were obtained from C. A. Suneson and C. W. Schaller, Department of Agronomy, University of California, Davis, California. Thanks are due to D. F. McAlister and Lamar C. Brown for reviewing the manuscript.

was released in California in 1944. The progeny from Martin backcrossed to Hard Federation for three generations was backcrossed to Ramona for six generations, and the resulting progeny was backcrossed to Ramona 44 for two generations to produce Ramona 50. The development of Ramona 50 can be expressed in outline form as three separate breeding programs:

Hard Federation X Bunyip ⟶ Ramona
White Federation 38 X Ramona^{3}* ⟶ Ramona 44
(Martin X Hard Federation^{3} X Ramona^{6}) X Ramona 44^{2}
⟶ Ramona 50

Ramona 50 wheat was released for commercial production in California in 1950. Ramona 50 was approved for certification in Arizona in 1957.

---

* The numerical superscript denotes the number of times the recurrent parent was used for backcrossing.

Onas 53 wheat is the cumulative product from a number of backcross projects conducted by the California Agricultural Experiment Station at Davis, California in cooperation with the U.S. Department of Agriculture. The original Onas variety was released for commercial production in California in 1923. The progeny from Martin backcrossed to White Federation for three generations was backcrossed to Onas for six generations to produce Onas 41 which was resistant to bunt (covered smut). Baart was backcrossed to Onas for nine generations to produce Awned Onas, an awned form of Onas. Awned Onas was backcrossed to Onas 41 for two generations to produce Onas 49, which was used as an experimental prototype of Onas 53. Kenya was backcrossed to Onas 49 for seven generations to produce Onas 53 which was resistant to both bunt and stem rust. The development of Onas 53 can be outlined as follows:

(Martin X White Federation^{3}) X Onas^{6} ⟶ Onas 41
Baart X Onas^{9} ⟶ Awned Onas
Awned Onas X Onas 41^{2} ⟶ Onas 49
Kenya X Onas 49^{7} ⟶ Onas 53

Onas 53 wheat was released for commercial production in California in 1953. Onas 53 was approved for certification in Arizona in 1957.

AGRONOMIC CHARACTERISTICS

GRAIN YIELD: During the three-year period, 1954 through 1956, Ramona 50 produced an average of 3,816 pounds of grain per acre, and Onas 53 produced 5,292 pounds per acre (table 1). Since Onas 53 produced about three-fourths of a ton more than Ramona 50, a sizeable premium for Ramona 50 would be required for a farmer to obtain the same net return per acre from Ramona 50 that can be obtained from Onas 53.

Table 1.—Average grain yield and bushel weight for six spring wheat varieties grown as winter annuals under irrigation at Mesa, Arizona in 1954, 1955, and 1956.

Variety	Wheat grain	
	Yield per acre	Bushel weight
	Lbs.	Lbs.
1. Awned Onas	5134	60.9
2. Baart 46	4128	62.8
3. Fedawa	4942	61.2
4. Lemhi	4068	58.9
5. Onas 53	5292	61.0
6. Ramona 50 (check)	3816	61.2
L. S. D. 5%	888	1.1
L. S. D. 1%	1260	1.5

WINTER PASTURE YIELD: The average winter pasture yields for Ramona 50 wheat and Onas 53 wheat are presented in table 2. Ramona 50 produced 15,562 pounds of green forage and 2,872 pounds of dry forage per acre, while Onas 53 produced 16,201 pounds of green forage and 3,097 pounds of dry forage per acre. These data indicate that Onas 53 is more desirable than Ramona 50 for winter pasture in Arizona. Arivat barley produced more pasture forage than either Ramona 50 or Onas 53 wheat.

Table 2.—Average winter pasture yield for Ramona 50 wheat, Onas 53 wheat, and Arivat barley grown as winter annuals under irrigation at Cortaro, Arizona in 1957 and 1958.

Variety and crop	Yield*	
	Green forage	Dry forage
	Lbs./A.	Lbs./A.
1. Ramona 50 wheat	15,562	2,872
2. Onas 53 wheat	16,201	3,097
3. Arivat barley	16,894	3,201

* One pasture cutting was made at the jointing stage of plant growth. Each variety was then permitted to continue growth and produce a grain crop.

BUSHEL WEIGHT: The average bushel weights for the grain from Ramona 50 and Onas 53 are given in table 1. Ramona 50 produced grain with a bushel weight of 61.2 pounds, while Onas 53 produced grain with a bushel weight of 61.0 pounds. For all practical purposes the bushel weights are identical.

LODGING RESISTANCE: Both Ramona 50 and Onas 53 are more resistant to lodging than Baart when grown in the irrigated areas of Arizona.

SHATTERING RESISTANCE: Ramona 50 is more susceptible to shattering than Baart. In Arizona, Onas 53 is similar to Baart in shattering resistance.

RELATIVE MATURITY: Ramona 50 is one to ten days earlier than Baart. Onas 53 is one to ten days later than Baart.

FROST TOLERANCE: Ramona 50 is more susceptible to damage from late spring frost than Baart. Onas 53 is less susceptible to damage from late spring frost than Baart.

HEAT TOLERANCE: If ample soil moisture is available, both Ramona 50 and Onas 53 have satisfactory heat tolerance.

DISEASE RESISTANCE: Ramona 50 and Onas 53 are both resistant to a number of races of bunt (covered smut), stem rust, and leaf rust.

MILLING CHARACTERISTICS

PROTEIN PERCENTAGE: The protein percentage of the grain from Ramona 50 and Onas 53 wheats grown at Mesa, Arizona (1954 through 1956) averaged 9.8 and 9.1%, respectively (table 3). The higher protein content of Ramona 50 over Onas 53 is one advantage in favor of Ramona 50 for milling purposes.

Table 3.—Average protein percentage, flour extract percentage, and milling rating for six spring wheat varieties grown as winter annuals under irrigation at Mesa, Arizona in 1954, 1955, and 1956.

Variety	Wheat grain		
	Protein	Flour extract	Milling
	%	%	Rating
1. Awned Onas	8.9	64	Poor
2. Baart 46	10.1	67	Poor
3. Fedawa	10.3	68	Poor
4. Lemhi	9.2	65	Poor
5. Onas 53	9.1	64	Poor
6. Ramona 50 (check)	9.8	69	Good
L. S. D. 5%	0.4	2	
L. S. D. 1%	0.5	3	

FLOUR EXTRACT PERCENTAGE: The average flour extract percentages for Ramona 50 and Onas 53 are reported in table 3. Ramona 50 produced 69% flour extract and Onas 53 produced 64%. Since Ramona 50 has a higher flour extract percentage than Onas 53, it is preferred by flour mills.

MILLING RATING: The "milling rating" is the rating given a wheat variety on the basis of its over-all performance in the flour mill. Arizona-grown Ramona 50 and Onas 53 were given general milling ratings of "good" and "poor," respectively (table 3).

BREAD BAKING CHARACTERISTICS

CRUST COLOR INDEX: Crust color is graded from *1* to *10*. Ten is the highest crust color index possible for high quality bread. Ramona 50 had a crust color index of *9.3* and Onas 53 had a crust color index of *5.3* (table 4).

CRUST CHARACTER INDEX: Crust character is also graded from *1* to *10*. A high numerical rating is preferred for wheats for bread baking. The crust character scores for Ramona 50 and Onas 53 were *6.0* and *5.2*, respectively (table 4).

CRUMB COLOR INDEX: Crumb color is graded from *1* to *10*, with a grade of *10* indicating high quality bread. The crumb color scores for Ramona 50 and Onas 53 are reported in table 4. Ramona 50 had a crumb color index of *4.5* while Onas 53 had a crumb color index of *5.0*.

Table 4.—Average bread baking characteristics of the flour from six spring wheat varieties grown as winter annuals under irrigation at Mesa, Arizona in 1954, 1955 and 1956.

Variety	Crust color	Crust character	Crumb color	Crumb grain	Loaf volume
	Index	Index	Index	Index	Cu. cms.
1. Awned Onas	5.3	5.3	5.8	7.0	2571
2. Baart 46	7.8	4.8	5.7	6.7	2517
3. Fedawa	8.0	7.0	4.8	7.0	2550
4. Lemhi	4.5	3.7	3.2	3.8	2292
5. Onas 53	5.3	5.2	5.0	5.3	2571
6. Ramona 50 (check)	9.3	6.0	4.5	5.8	2392
L. S. D. 5%	1.7	1.6	1.7	1.5	82
L. S. D. 1%	2.4	2.2	N.S.	2.1	114

CRUMB GRAIN INDEX: Crumb grain refers to the cell structure of the bread as shown on the surface of a cut slice. Crumb grain is graded from *1* to *10*. A grade index of *8* is the minimum acceptable for high quality bread. The crumb grain index values for Arizona-grown Ramona 50 and Onas 53 were *5.8* and *5.3*, respectively (table 4).

LOAF VOLUME: In bread baking, loaf volume is measured in cubic centimeters (cc.). High loaf volume is desirable in bread baking. High quality flour from wheat with 10% protein should produce a loaf volume of about 2400 cc. Ramona 50 produced a loaf volume of 2392 cc. while Onas 53 produced a loaf volume of 2571 cc. (table 4).

BREAD RATING: The "bread rating" is the over-all bread quality rating given a specific wheat variety, and is actually a summation of all of the individual bread baking quality characteristics. Ramona 50 and Onas 53 wheats grown in Arizona were given general bread ratings of "poor" and "fair," respectively (table 6).

CAKE BAKING CHARACTERISTICS

CRUMB COLOR INDEX: In cake baking tests, crumb color is graded from *1* to *10*. High quality cake flour will produce cake with a crumb color index of *10*. Ramona 50 had a crumb color index of *6.0* and Onas 53 had a crumb color index of *5.0* (table 5).

GRAIN INDEX: "Grain" refers to the cell structure of the cake as shown on the surface of a cut slice. Cake grain is graded from *1* to *10*. Eight is the minimum grain rating acceptable for high quality cake. Both Ramona 50 and Onas 53 had a cake grain score of *7.7* (table 5).

TEXTURE INDEX: Cake "texture" refers to the feel of a cut slice. Cake texture is also graded from *1* to *10*. Texture ratings can go above *10* (normal), but *8* is usually the minimum for high quality cake flour. Ramona 50 and Onas 53 had cake texture scores of *7.5* and *7.3*, respectively (table 5).

LAYER VOLUME: In cake baking, layer volume is measured in cubic centimeters and a high volume is desirable. A layer volume of approximately 1120 cc. is the minimum acceptable for high quality cake flour. Ramona 50 had a layer volume of 1053 cc. and Onas 53 had a layer volume of 1112 cc. (table 5).

LAYER CAKE RATING: The "cake rating" is the over-all cake quality rating given a specific wheat variety. It is a summation of all of the individual cake baking quality characteristics. Ramona 50 and Onas 53 wheats grown in Arizona were given general cake ratings of "poor" and "fair," respectively (table 6).

Table 5.—Average layer cake baking characteristics of the flour from six spring wheat varieties grown as winter annuals under irrigation at Mesa, Arizona in 1954, 1955 and 1956.

Variety	Crumb color	Grain	Texture	Layer volume
	Index	Index	Index	Cu. cms.
1. Awned Onas	5.5	6.3	7.3	1106
2. Baart 46	5.8	7.0	7.8	1095
3. Fedawa	4.5	7.5	7.8	1090
4. Lemhi	4.0	7.7	8.0	1105
5. Onas 53	5.0	7.7	7.3	1112
6. Ramona 50 (check)	6.0	7.7	7.5	1053
L. S. D. 5%	1.6	N.S.	N.S.	23
L. S. D. 1%	N.S.	N.S.	N.S.	31

Table 6.—Summary of the milling and baking qualities of six spring wheat varieties grown as winter annuals under irrigation at Mesa, Arizona in 1954, 1955 and 1956.

Variety	Milling	Bread	Layer cake
	Rating	Rating	Rating
1. Awned Onas	Poor	Fair	Fair
2. Baart 46	Poor	Fair	Poor
3. Fedawa	Poor	Fair	Fair
4. Lemhi	Poor	Poor	Fair
5. Onas 53	Poor	Fair	Fair
6. Ramona 50 (check)	Good	Poor	Poor

FIG. 1

Fig. 1—Heads and kernels of Ramona 50 wheat, three-fourths natural size.

FIG. 2

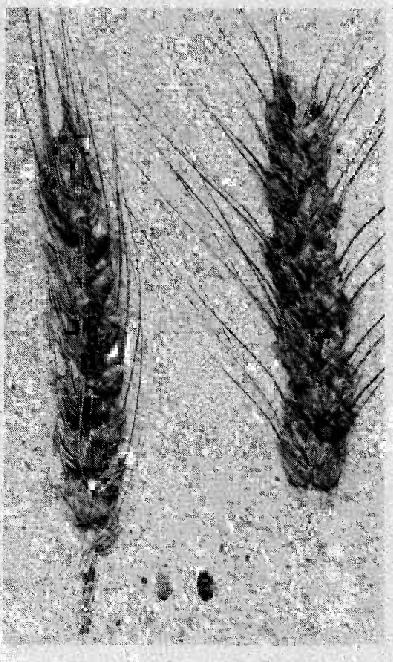

Fig. 2—Heads and kernels of Onas 53 wheat, three-fourths natural size.

PLANT CHARACTERISTICS

GROWTH HABIT: Ramona 50 and Onas 53 both have a spring growth habit. However, in Arizona they are normally grown as winter annuals. They are usually planted in November or December and harvested in May or June of the following year.

ROOTS: Both Ramona 50 and Onas 53 have root systems that are broad, deep, and well adapted to irrigated agriculture.

STEMS: Ramona 50 has semi-large, white stems of medium height and stiffness, with small leaves. Onas 53 has large, white stems of medium height and stiffness, with large leaves.

LEAVES: Ramona 50 has small, light green leaves. Onas 53 has larger than average, dark green leaves.

HEADS: Ramona 50 has oblong, medium-dense heads with awnless, brown glumes (Fig. 1). Onas 53 has oblong, dense heads with awned, white glumes (Fig. 2).

KERNELS: The kernels of Ramona 50 are white, semi-hard, ovate, and medium-size with a large germ and a semi-open crease (Fig. 1). The kernels of Onas 53 are white, soft, ovate and medium-size with a medium-size germ and an open crease (Fig. 2).

UTILIZATION

Ramona 50 has "good" milling quality and it is preferred by Arizona flour mills. Its baking qualities are less satisfactory than its milling responses.

Onas 53 is the highest yielding "feed" wheat in most areas in Arizona. It is superior to Ramona 50 for winter pasture, green chopped feed, and hay production. In general, the milling properties of Onas 53 are less desirable than its baking qualities.

AREAS OF PRODUCTION

Ramona 50 wheat is grown commercially in California, Nevada, and Arizona. Onas 53 is grown commercially in California and Arizona.

ORGANIZATION

Board of Regents of the University and State Colleges of Arizona

ERNEST W. MCFARLAND (ex officio), A.B., M.A., J.D., LL.D. ..... Governor of Arizona
MARION L. BROOKS (ex officio), B.S., M.A. ..... State Superintendent of Public Instruction

---

JOHN M. JACOBS ..... Term expires Jan., 1959
EVELYN JONES KIRMSE, A.B., A.M., President ..... Term expires Jan., 1959
ALEXANDER G. JACOME, B.S., Treasurer ..... Term expires Jan., 1961
WILLIAM R. MATHEWS, A.B., LL.D., Secretary ..... Term expires Jan., 1961
LYNN M. LANEY, B.S., J.D. ..... Term expires Jan., 1963
SAMUEL H. MORRIS, A.B., J.D., LL.D. ..... Term expires Jan., 1963
JOHN G. BABBITT, B.S. ..... Term expires Jan., 1965
ELWOOD W. BRADFORD, B.S. ..... Term expires Jan., 1965

EXPERIMENT STATION ADMINISTRATION

RICHARD A. HARVILL, Ph.D. ..... President of the University
ROBERT L. NUGENT, Ph.D. ..... Vice-President of the University
DAVID L. PATRICK, Ph.D. ..... Vice-President of the University
NORMAN S. HULL, LL.D. ..... Vice-President of the University

HAROLD E. MYERS, Ph.D. ..... Dean
RICHARD K. FREVERT, Ph.D. ..... Director
JOHN BURNHAM, B.A. ..... Editor

Your
COLLEGE of AGRICULTURE
Has Several
BRANCH OFFICES

That's right — the College of Agriculture of your University of Arizona has a "local office" convenient to you, wherever you may live in this wide state.

These "branch offices," of course, are the County Extension offices in most Arizona counties. There also are the "branch offices" of Experiment Stations at Mesa, Safford, Yuma and Phoenix.

All of these are part of your University of Arizona and its College of Agriculture. They are placed where they are purposely to help ranchers, farmers and homemakers throughout this state.

Your County Agent has a wide variety of free bulletins written by Arizona agricultural scientists and directed at Arizona conditions and problems. Use your County Agent and Your County Home Agent. They are there to serve you.

And when the Branch Experiment Station near you has a field day, to show and tell about its work, attend and learn from what is told and displayed there.

Harold E. Myers

Dean
College of Agriculture
University of Arizona