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ARIZONA
Grain Research &
Promotion Council

Chairman's Report

By David Sharp, Roll

As usual, this report is being prepared during Arizona's fall small grains planting season. At the time, we are operating with little durum market intelligence that could provide producers with some sense that current Desert Durum® contract offerings might rise enough in time to make durum a hot planting choice. And, even Arizona's perpetual feed-deficit status is not going to make local barley production a profitable marketing enterprise.

Sure, we know that both the Northern U.S. and Canada harvested sizable durum crops and that the U.S. durum crop, at least, is generally of rather good quality with rather limited regional DON (mycotoxin) issues. This fact alone encourages the domestic durum buyers to avoid chasing the 2017 Desert Durum® crop at this time of year. From their perspectives, adequate supplies of decent quality durum are there for the taking, once they are sorted out. So, with little current interest in our 2017 crop, there is nothing to significantly boost 2017 Desert Durum® crop price offerings from our handlers.

Meanwhile, our European customers of Desert Durum® see that other U.S. durum stocks of decent to very good quality are plentiful and cheap compared to likely Desert Durum® stocks and prices. Also, they face a stronger dollar than in recent years, making even what we consider to be pedestrian prices somewhat more expensive for export. Our Arizona-based grain handlers have completed their annual visits to assess the Italian market's demand for 2017 Desert Durum® and found a wait and see attitude similar to the domestic market's; one that seems likely to turn the central Arizona planting window into a rear view.

While the durum market is presently uninspiring, the local barley market is seems to be hardly even a market. Our livestock industry can buy trainloads of corn from the Midwest at a discount from the price that will lure our growers to plant barley. There is little prospect that this inversion (or, should I say "perversion"?) will change in the coming year, given the huge 2016 U.S. corn crop and corn available at less than $150/ton through 2017

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Desert Durum® acquires new legal registration as a certification mark

Use of the terms to describe grain now requires approval by the AGRPC or the CA Wheat Commission

The U.S. Patent and Trademark Office has registered the identity of Desert Durum® as a certification mark, that when used to identify durum grain, "…certifies or is intended to certify that the goods provided are at least 90% wheat grain produced under irrigation in the desert valleys and lowlands of Arizona or California." The certificate of registration, Number 4,946,449, was issued on June 14 2016. It names the Arizona Grain Research and Promotion Council and the California Wheat Commission (CWC) as the owners of the mark.

The practical consequence of the registration is that any party that wishes to describe its grain as Desert Durum® must request permission from either of the owners to use the mark. Such permission must be granted for so long as the users agree to comply with the definition as registered.

Trademark law states that the owners of a certification mark must control or be able to exercise legitimate control over the mark's use. Therefore, AGRPC and CWC must take steps to ensure that the mark is used as intended. In this regard, the two organizations are in the process of adopting an application/licensing form that contains terms of use and defines how the mark is to be used by the applicant. The draft application form was prepared by a patent and trademark attorney. The two groups are also determining how they will monitor the use of the mark by both authorized and potential unauthorized parties.

The sole focus of the mark is to certify that grain identified as Desert Durum® meets the registered definition. However, AGRPC and the CWC may use the terms Desert Durum® to promote the identity and origin of durum grain grown as described in the registration certificate. The registration does not stipulate grain quality traits.

Potential users of the mark are encouraged to contact the AGRPC or the CWC promptly to seek permission to use it. Use of the name Desert Durum® without permission or to describe any grain that does not meet the legal definition, as registered, will constitute an infringement of the owners' rights.

What's Inside.....

A message to Arizona's grain growers

The Arizona Grain Research and Promotion Council was created in 1986 by the Arizona legislature as a producer-funded and producer-directed program to assist in developing the state's grain industry to be more productive and profitable. The council participated in the State's sunset review re-authorization process during 2012 and 2013. The 2013 Arizona legislature passed legislation, signed by the governor, which has extended the council's existence and assessing authority until 2023.

Programs and projects in which the council may engage include:

1. Cooperation in state, regional, national or international activities with public or private organizations or individuals to assist in developing and expanding markets and reducing the cost of marketing grain and grain products.
2. Research projects and programs to assist in reducing fresh water consumption, developing new grain varieties, improving production and handling methods and in the research and design of new or improved harvesting or handling equipment.
3. Any program or project that the council determines appropriate to provide education, publicity or other assistance to facilitate further development of the Arizona grain industry.

The council consists of seven members appointed by the governor for three-year terms. Members must be residents and producers in the state and they serve without compensation. Producers seeking consideration for appointment to the council may contact the Arizona Department of Agriculture's council administrator (602-542-3262).

The council has established a check-off fee of $.025/cwt. ($.50/ton) on the barley and wheat of all classes that is produced in Arizona and sold "...for use as food, feed or seed or produced for any industrial or commercial use." Thus, all grain of these kinds is subject to the assessment when it is first sold to a buyer or "first purchaser".

Check-off fees are collected by the "first purchaser" and remitted to the council, in care of the Arizona Department of Agriculture. While producers bear primary responsibility for paying the fee, this liability is discharged if the fee is collected by the first purchaser.

Producers may request a refund within 60 days of paying the fee by submitting the appropriate refund request form available from the council.

The council's quarterly meetings are open to the public. Meeting dates and agendas can be obtained from the ADA council administrator's office.

Producers of grain in Arizona are urged to contact any council member with comments or ideas pertaining to the council's mission or activities.

AGRPC's promotional & service contributions - 2016 calendar year

- Wheat Foods Council ($500) – Annual "Supporter" membership
- Southwest Ag Summit ($1,500) – Student breakout session sponsorship
- Summer Ag Institute ($1,000) – Sponsorship of teacher educational program
- Ag In The Classroom ($1,500) - Sponsorship of state representatives' national convention lunch
- Yuma Area Agricultural Council ($1,500) – Sponsorship of Agricultural Worker/Pesticide Handler training video production to meet EPA regulations
- California Grain Foundation ($2,500) –Annual Collaborator program support
- Arizona Farm Bureau ($2,000) – Annual Gold Sponsorship
- Arizona Farm Bureau ($500) - to assist re-supplying Ag In The Classroom kits

AGRPC Members

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AGRPC'S FY 2016 Financial Statement

Beginning fund balance	$150,173
Income items:	
Assessments	$221,814
Investment income	2,033
Less refunds to producers	(8,462)
Net income	$215,385
Total operating fund balance	$365,558
Expenses	
Executive Director (1)	$18,000
ADA Administration	7,500
U.S. Wheat Associates	27,600
Travel & Meeting	8,084
Desert Durum® Quality Survey	3,704
Trade Teams	0
Annual Newsletter	1,562
Promotion & Advertising	13,246
Research Projects	70,494
Miscellaneous	0
Total expenses	$150,190
Ending fund balance	$215,368

(1) Contract with Allan B. Simons

Chairman – *Continued from page 1*

Post-mortem on the 2016 crop

This past year's durum crop was not affected by the weather-related issues that caused considerable grain quality damage in our huge 2015 crop, some of which suffered significant discounts for poor color or more Karnal bunt than usual. AGRPC's Desert Durum® 2016 crop quality sampling program collected small samples from every load of durum grain which arrived at the state's elevators. These small sub-samples were then composited, by variety on a location-weighted basis. The varietal composites were given official federal grain grades and sent to the California Wheat Commission (CWC) lab for milling, semolina, and pasta testing.

Average test weight for the combined crop of all Desert Durum® grain of Arizona and California origin was 62.9 lbs/bushel, a bit above the 5-year average of 62.7. HVAC was 97%, above the 5-year average of 96%. Moisture was 6.8% compared to the 5-year average of 6.7%. Almost all grain factor numbers in the 2016 crop were equal to or slightly better than in the 2015 crop. Protein content in 2016 averaged 13.9% on a dry matter basis compared to 13.5% for the 5-year average. Kernel size distribution this year was 91% large and 9% medium compared to 90% large and 10% medium averaged over 5 years.

Two grain quality factors that always favor Desert Durum® are its low moisture content and uniform large kernel size. Grain moisture content in the 7-8% range that characterizes Desert Durum® gives customers about 80 lbs. more actual wheat grain per ton purchased than they get from grain produced in non-desert origins. The highly uniform large kernels that also characterize Desert Durum® contribute to higher mill extraction rates than is obtainable with grain of less uniform size distribution.

We heard numerous reports of excellent durum yields during harvest – at well over 3 tons/acre. However, the USDA's survey of growers resulted in a published yield average of just under 3 tons/acre. At the end of the day, the crop was the crop, whether or not statistics are correct.

Sustainability goes beyond water footprint

Last year's newsletter contained a detailed discussion of a research report, commissioned by the AGRPC, which determined that the "water footprint" of growing wheat in the southwestern desert is about the lowest in the world for that sustainability metric. That finding refutes the global common wisdom that our water footprint is high enough so as to virtually disqualify Desert Durum® as a source of semolina flour in the sustainability components of some business plans.

However, what if we determine that growing small grains in the river valleys of the state is an essential rotational practice for sustaining those valley soils for continued use in growing the produce that supplies much of the country during the winter months? That apparent fact is to be investigated in depth during a large study being partially supported by the AGRPC (see the summary of the grant plans elsewhere in this issue). A project studying water and salt balance in Arizona cropping systems is being coordinated by the UA's Yuma Center of Excellence and the Yuma Water Coalition. AGRPC's contribution will focus on the water and salt issues affecting a produce-durum wheat rotation in the Colorado River flood plain.

Quality, quality, quality

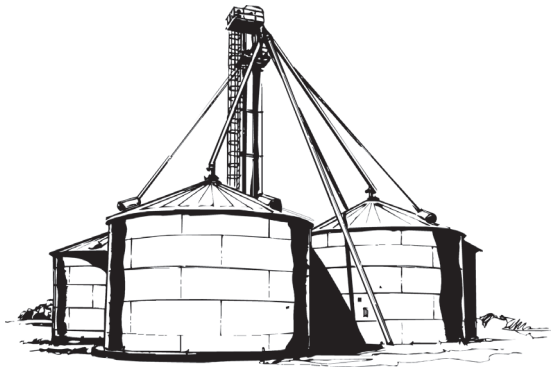
AGRPC spends a significant sum each year to characterize the quality of Arizona's Desert Durum® crop, as I described above. The results are important enough that the AGRPC and the CWC jointly publish a detailed report for use by our handlers, their customers, and by U.S. Wheat Associates for export promotion.

Desert Durum® varieties are developed to exhibit both high grain yield and the superior grain, milling, and pasta-making qualities that are achievable in the unique production environment that we enjoy. This environment is conducive to producing consistently high quality grain each season when Arizona producers provide the cultural resources to take advantage of the intrinsic capabilities of the varieties that our plant breeding partners give us.

The AGRPC urges all Arizona growers to help maintain the reputation of Desert Durum® as the most reliably high quality durum grain produced in the world. This objective means providing the attention and nutrient inputs needed to achieve high HVAC and satisfactory protein content.

Expressions of gratitude

Arizona Department of Agriculture staffers who assist the Council in various ways include Assistant Director Brett Cameron and Council Administrator Lisa James. Lisa is completing her 13th year serving as the AGRPC's primary liaison with the Department. She handles open meeting compliance issues, most of our official correspondence and documentation, and financial record-keeping with expertise and good humor. We are fortunate to have her on our team. Finally, I continue to appreciate the AGRPC's association with Executive Director Al Simons, who is completing his 22nd year in support of AGRPC activities and representing the Council within Arizona and elsewhere.



This annual report and newsletter of the Arizona Grain Research and Promotion Council was edited and published by the AGRPC's contracted Executive Director, Allan B. Simons. E-mail: simons42ab@gmail.com. Phone: 520-429-1221. Contact the Arizona Department of Agriculture to obtain remittance and refund forms. 1688 W. Adams, Phoenix, AZ 85007. Phone: 602-542-3262. Fax: 602-364-0830. Lisa James - Council, Board, and Commission Administrator. E-Mail: ljames@azda.gov

U.S. wheat farmers benefit from USDA and grower export promotion programs

(Adapted from U.S.Wheat Associates releases)

Agricultural export market development programs funded through the Farm Bill have contributed an average of $8.2 billion per year to farm product export revenue from 1977-2014, totaling over $309 billion, according to a recent study released by land grant university economists.

These programs have accounted for 15% of all the revenue generated by export of U.S. agricultural products during that period, concluded the study headed by an economist at Texas A & M University. The study examined the effectiveness of USDA's Market Access Program (MAP) and the Foreign Market Development (FMD) program. These programs are part of a public-private partnership that provides competitive grants for export development and promotion activities to non-profit agricultural organizations that also contribute their own funds from check-off programs and industry support.

This study measured the general effectiveness of total MAP and FMD funding, determining that the programs boosted average annual U.S. farm cash income by $2.1 billion and average annual U.S. farm asset value by $1.1 billion over the period from 2002-2014. The programs increased average annual U.S. total economic output by $39.3 billion, GDP by $16.9 billion, and labor income by $9.8 billion over that period. In addition, these programs were responsible for creating 239,000 new jobs, including 90,000 farm jobs. The study also determined that elimination of federal MAP and FMD funding would reduce average annual agricultural export revenue by $14.7 billion, with a decline in farm cash income of $2.5 billion and significant drops in GDP and jobs.

The non-profit agricultural organizations that participate in MAP- and FMD-funded export programs contributed about $470 million to them in 2014, which was more than 70% of the total program funding. The federal budget for MAP has been static at $200 annually since 2006, with the FMD budget fixed at $35.5 million since 2002. Participating organizations must compete for funding by preparing very detailed annual applications describing their ongoing programs, with market analyses, activity objectives, and evaluations of local results.

2016 Arizona Karnal bunt survey results

Data released by the USDA/APHIS-PPQ in Phoenix following the 2016 Arizona wheat crop harvest indicate that two (2) of the 301 wheat fields located in Arizona's Karnal bunt (KB) quarantine areas tested positive for KB, with each 4-lb sample containing two (2) bunted kernels. This finding was substantially under the incidence of the fungal disease that occurred in the 2015 crop. The two positive fields of durum wheat were located in the Maricopa/Stanfield area south of Phoenix.

Wheat was planted on 11,766 acres within the quarantined area this past season, down from 22,479 acres planted in 2015, when 36 of 502 fields tested positive. The unusually large number of positive–testing fields in 2015 was attributed mostly to the occurrence of untimely rains during the critical flowering period and to the widespread use of sprinkler irrigation with the large planted 2015 crop.

The 2016 crop's regulated area totaled 500,069 acres, all located in La Paz, Maricopa, and Pinal Counties. The KB quarantine was implemented in 1996 after bunted kernels were found in samples from 17 Arizona wheat fields. The pathogen has been recognized as a federal quarantine pest since about 1983.

KB quarantine regulations now enforced by APHIS-PPQ require that wheat fields located within the regulated areas be sampled and examined for bunted kernels before harvest. Grain from fields in which bunted kernels are found must be treated and used as animal feed. Fields found to be KB-positive are designated as regulated fields and all other fields and land located within a three-mile radius fall into the KB quarantine area if they are not already in it. The positive findings in 2016 will add nearly 6,000 acres to the regulated area of Pinal County.

Regulated fields can achieve deregulation according to a protocol that involves tillage and/or negative KB sampling of host crops for a total of five years. Deregulation of a field may eliminate surrounding fields and land from quarantine status, depending on the proximity of nearby regulated fields. Six (6) total regulated fields located west of Phoenix and on the Colorado Indian Tribe Reservation qualified for deregulation after the 2016 season freeing about 19,000 local acres from regulation.

APHIS/PPQ in Phoenix can inform growers of the potential regulated status of their fields and cultural requirements to remove them from regulation (Phone 602-431-3216). A U of A brochure that details management practices that may minimize the likelihood of KB infection in their host crops is available at: *http://uacals.org/395.*

USW and AGRPC participation in export promotion

U.S. Wheat Associates (USW) represents U.S. wheat farmers in overseas markets and participates in the MAP and FMD programs. From 2012-2016, the combined programs contributed an annual average of $11 million to match USW's average funding of $5 million to conduct its programs promoting the export and use of the classes of wheat grown in the U.S. The federal funds are used to operate offices and programs in 15 important market centers servicing more than 100 countries around the globe. Domestic checkoff funds go largely toward maintaining offices in Portland and Arlington, VA.

A recent study commissioned by USW showed that investing in U.S. wheat export promotion produced a beneficial impact for producers and the economy that far exceeded its cost. The econometric models employed showed that, between 2010 and 2014, the total investment in wheat export promotion by farmers and the government increased total annual gross revenue by $2.0-$3.0 billion. The estimated return in gross revenue was $112-$179 for every $1 invested by farmers and the government.

AGRPC joined USW shortly after its own inception in 1986. AGRPC's annual assessment contribution to USW constitutes well under 1% of USW's annual producer funding. Therefore, Arizona's wheat growers enjoy enormous leverage from the 99% of producer funding provided to USW programs by larger wheat-producing states. USW's support of the Desert Durum® industry has played a significant role in growing and maintaining the current outstanding global reputation enjoyed by Arizona's premium durum wheat crop.

AGRPC represented on USW overseas trip

AGRPC member Michael Edgar, who is also president of Barkley Seed, Inc. in Yuma, was part of a small group of wheat industry representatives organized by U.S. Wheat Associates (USW) that visited several important wheat importing countries in Europe and Africa in March 2015. Edgar was joined by representatives of USW member organizations in Oklahoma and Texas. Erica Oakley, Program Manager at USW's main office in Arlington, VA, accompanied the group, which visited the wheat-buying countries of Morocco, Italy, and Israel.

Such board teams, as they are known by USW, serve two roles. They educate representatives of the state wheat groups that financially support USW's export promotion efforts. They also provide existing and potential foreign market customers opportunities to offer their perspectives on their experiences with importing wheat from the U.S. and explaining their own market preferences.

The typical itinerary of board team trips to specific export market regions has local USW representatives arranging for, and accompanying, the teams' visits to significant wheat-buying or processing entities. The value of these trips is impossible to measure quantitatively, according to USW. But, an open and direct line of communication between and among wheat growers, wheat millers, and those who transform the wheat to meet end user preferences provides benefits for all.

Edgar, a former chairman of USW, is well aware of the role that such face-to-face experiences play in establishing and maintaining foreign markets, since he has engaged in supporting and expanding those markets for Desert Durum® for over 25 years. "I absolutely know that spending face-to-face time with both existing overseas customers and those who might become customers is an essential part of maintaining and promoting the sale of about half of the annual production of our identity-preserved Desert Durum® crop. I am comfortable with devoting both AGRPC's producer resources and my company's time to USW activities, when they arise, to promoting our unique durum wheat to existing and potential markets. I am also confident that our industry competitors in the state agree with this perspective."

Countries visited

Morocco produces lots of durum wheat when climate conditions permit. About 90% of its wheat crop is rain-fed, but the region is subject to periodic droughts, such as the 2016 conditions that reduced its harvest by over 90% to about 2.5 million tons (or 10 times Arizona's 2016 crop). The primary use for durum in Morocco is making couscous, a semolina flour product that is a common staple in North Africa. A deep yellow color is the dominant requirement for durum grain sold in this market. Desert Durum® grain meets this need but importers supply their needs, when necessary, from cheaper sources.

The Italian market is well acquainted with Desert Durum® and was very instrumental in creating the exiting image of our durum as the "gold standard" for gluten strength, low moisture, and high milling extraction. The price Italians are willing to pay to encourage Desert Durum® production is often the most limiting factor in this export market.

Israel is not a realistic significant market for Desert Durum® due, in part, to its cultural preferences for other classes of wheat that best fit its preferred wheat-based products.

USW helps keep Desert Durum® globally visible

AGRPC is a full-paying member of USW, as computed on a formula related to volume of annual wheat production. Thus, AGRPC enjoys access to the same USW program resources that are available to state member organizations that annually contribute more than 30 times as much in assessments. Periodic eligibility to participate in board teams visiting potentially relevant durum markets is one such benefit.

AGRPC representatives, in addition to Edgar, who have been privileged to join these teams in the past include Steve Sossaman of Queen Creek, Greg Wuertz of Casa Grande, Eric Wilkey of Arizona Grain, Inc., and Al Simons, AGRPC's executive director. While the AGRPC is presented with board team travel opportunities every 2-3 years, the time needed to participate (10-14 days) has been a limiting factor in finding volunteer travelers.

Michael Peters (left) of the Oklahoma Wheat Commission and Ken Davis of the Texas Wheat Board (center) accompanied AGRPC member Michael Edgar (right) on the USW board team journey to Morocco, Italy, and Israel in March 2016. Erica Oakley, Program Manager with USW in Arlington, VA accompanied the growers.

Michel Edgar of Yuma, a member of the AGRPC, makes a point about a milling issue to Michael Peters (Oklahoma) as Ken Davis (Texas, far left) listens during a USW board team visit to a mill in Israel in March 2016.

Research grants funded – FY 2017

Note: *Grants 17-01, 17-02, 17-04, and 17-05 were submitted by Dr. Michael J. Ottman, Extension Agronomy Specialist and Professor, CALS, University of Arizona. Grant 17-03 was submitted by Dr. Charles Sanchez, Soil and Water Research Scientist, CALS, University of Arizona. Grant 17-06 was submitted by Dr. Wesam AbuHammad, Plant Breeder, Arizona Plant Breeders.*

17-01: Small grains variety testing ($5,250)

Rationale: The seed is the starting point in crop production. Seed companies provide variety characteristics but there is still a need for unbiased testing of varieties overseen by an independent entity such as the University of Arizona.

Objective: To evaluate performance of commercially available barley and wheat varieties at the Maricopa Ag Center.

Procedures: Commercially available varieties of durum (about12) and barley (about 6) will be planted at the Maricopa Ag Center in December. The plots will be small (5 ft x 20 ft) and will not include experimental varieties. Measurements will include heading, flowering, and maturity date, plus plant height, lodging, test weight, grain protein, and yield.

17-02: Late season N application method effect on grain protein ($9,902)

Rationale: Nitrogen fertilizer is normally applied later in the season, around flowering time, to boost grain protein content. These late-season N applications are not expected to affect grain yield. The fertilizer is usually applied as UAN32 in the irrigation water. However, the fertilizer can also be applied as a foliar or granule. Foliar N application is not tied to irrigation water application. Granular N is a cheaper source and is usually distributed more uniformly than liquid forms applied in the irrigation water. Some evidence exists that foliar N gets into the plant more efficiently than granular forms of N.

Previous work on the subject (funded by AGRPC) was inconclusive in that late season N application did not affect grain protein averaged across varieties, regardless of method of application when compared with the control. However, late application increased protein in one variety and application method differed in effectiveness.

Objective: The objective of this study is to repeat evaluating the effects of late season nitrogen application method on grain protein.

Procedures: A trial comparing late season N application methods will be established in December on small plots (20 ft x 20 ft) at the Maricopa Ag Center. The treatments will consist of 3 durum varieties and 3 late season N application treatments (granular with urea, foliar with liquid urea, none). The late season N rate will be about 35 lbs. N/acre and the crop will have been fertilized with about 200 lbs. N/acre up to this point. The late season N application will be applied at flowering. Data collection will consist of dates of heading, flowering, and maturity, plus plant height, lodging, grain yield, test weight and grain protein.

17-03: Water and salt balance for durum wheat irrigation ($16,903)

Rationale: Water and salt management in crop fields are important aspects of agricultural sustainability in the lower Colorado River region near Yuma. Irrigation water contains salts, as does the shallow ground water in the valleys that fluxes up through the fine-textured soil by capillarity. Therefore, some level of excess irrigation (beyond crop consumptive use) must be applied to leach salts below the crop root zone. Effective leaching is especially important because many of the crops produced in this region are sensitive to salinity.

Crop production systems and rotations in the region utilize a number of irrigation application methods. The systems and their management can have a profound impact on water delivery, leaching achieved, and resulting salt distribution. Level-basin flooding, level impounded furrow flooding, and sprinkler application each influence opportunity time, water distribution, and application depth and, therefore, salt-leaching profiles.

Objective: To quantitatively track water use and salt balance across typical crop production systems and rotations in the lower Colorado River basin while growing produce followed by durum wheat.

Procedures: Data collection on the entire cropping system will begin in August during the pre-irrigation for fall produce and continue through produce and durum wheat crops. Electromagnetic surveys (EM38) augmented with soil samples will be used to estimate spatial- and depth-related salinity distributions. Water measurement flumes and data loggers will quantitate the water delivered during irrigations. Water depth sensors and recorders will measure infiltration in transects across the field from the inlet end to the downstream boundary during irrigation events. Water evaporation losses from fields during irrigation events will be determined. Sensors will record soil water, soil salinity, and soil temperature through the soil profile on an hourly basis during and between irrigation events.

17-04: Can the yield of late-planted small grains be enhanced by nitrogen fertilizer rates? ($9,459)

Rationale: Wheat and barley may be planted later than optimum following a previous crop or to reduce the risk of frost damage. The seeding rate of late-planted small grains is often increased as a way to increase the number of stems and productive spikes per acre, but with erratic results. Short growing seasons with high temperatures and possible moisture stress are possible reasons for uncertain outcomes. It may be possible to partially compensate for lower yield potential of late plantings by increasing nitrogen rates beyond what would have an effect at more optimal plantings. Nitrogen fertilizer rates that may be excessive at early planting dates might increase tillering of late plantings to enhance yield potential.

Objective: To evaluate the effects of nitrogen rates on late-planted durum wheat and barley

Procedures: A trial testing nitrogen rates on late-planted wheat and barley will be established in December on small plots at the Maricopa Ag Center. The treatments will consist of two planting dates (December 15 and February 15) and two varieties (one durum and one barley) grown at three input levels of N (low, medium, and high), corresponding to 67%,

100%, and 150% of optimum, respectively, determined using soil sampling and plant analysis. Data collection will consist of dates of heading, flowering, plant height, lodging, grain yield, test weight, and grain protein. Previous research on the use of nitrogen and water to increase late-planted crop yields was largely unsuccessful, due in part to high rates of lodging.

17-05: Small grains variety testing in plant breeder nurseries ($3,873)

Rationale: Variety trials conducted by plant breeding firms in diverse locations provide additional information to that available from the unbiased variety testing of commercial barley and wheat varieties conducted by the University of Arizona,

Objective: To evaluate commercially available barley and wheat varieties at Arizona City and in the Gila Valley and Yuma Valley.

Procedures: Variety tests on small plots will be conducted at the three locations by three plant breeding programs. Varieties included will be 12 wheat, 6 barley, and a number of experimental lines developed by the breeding programs. Measurements taken will include yield, test weight, kernel weight, grain protein, and vitreous count (where appropriate).

17-06: Double haploid breeding method to improve lodging resistance in durum wheat ($10,700)

Rationale: Lodging is often a serious problem in durum wheat fields, reducing grain yield and quality and increasing harvest costs. This project is an advancement of the project previously funded by AGPRC that aims to introduce increased lodging resistance in durum lines by interspecific hybridization with triticale. Double haploid technology can significantly accelerate the process of reaching homozygosity of the hybridization, saving several generations of crossing and testing that characterizes conventional breeding procedures.

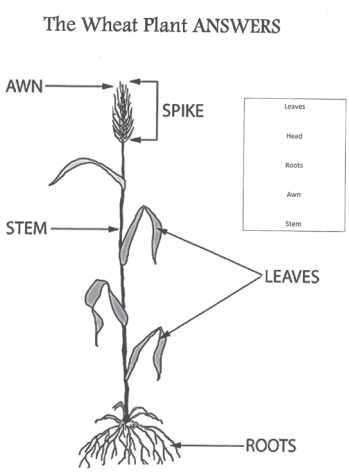
Objectives: To obtain homozygosity in the interspecific hybrids already developed. The longer term objective is to provide Arizona farmers with new high quality durum wheat lines that are high yielding and resistant to lodging. Homozygous double haploid lines should be available in one year or so, with breeder seed eventually made available to the industry.

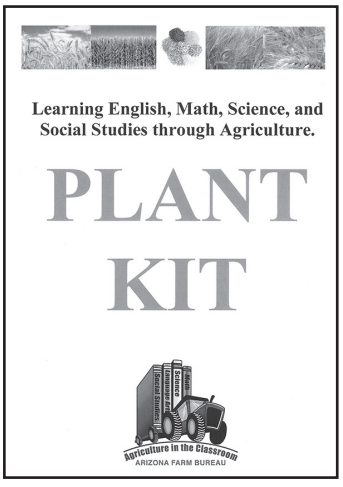
Procedures: The F_1 seed produced from the first year of the AGRPC–funded project will be sent to a program in Kansas to produce double haploid lines, which will be returned to Arizona for purification and verification of straw strength attributes, among others.

Online guide to U of A small grains research and extension publications

(Insert the specific link for any publication at the end of the following URL, replacing the xxxxx with the appropriate entry: **http://extension.arizona.edu/pubs/xxxxxxxxx)**

- Wheat and barley varieties for Arizona (October 2016): **az1265-2016.pdf**
- Growing grain sorghum in Arizona (October 2016): **az1489-2016.pdf**
- Fertilizing small grains in Arizona (May 2015): **az1346-2015.pdf**
- Irrigation of small grains in Arizona (May 2015): **az1345-2015.pdf**
- Small grain growth and development (May 2015): **az1347-2015.pdf**
- Planting dates for small grains in Arizona (May 2015): **az1332-2015.pdf**
- Planting methods for small grains in Arizona (May 2016): **az1333-2015.pdf**
- Seeding rates for small grains in Arizona (May 2015): **az1334-2015.pdf**
- Cultural practices for Karnal bunt control (May 2015): **az1287-2015.pdf**
- Effect of planting date on wheat yield in Yuma, 2014 (February 2015): **az1647-2014.pdf**
- Small grains variety evaluation at Arizona City, Maricopa and Yuma, 2014 (February 2015): **az1648-2014.pdf**
- Determination of optimal planting configuration of low-input and organic barley and wheat production in Arizona, 2013 (June 2014): **az1630-2014.pdf**
- Sensor-based management of nitrogen on irrigated durum wheat in Arizona, 2013 (June 2014): **az1629-2014.pdf**
- Recommendations for growing standard height wheat varieties in Arizona (January 2014): **az1612.pdf**
- Forage and grain report 2013 (May 2013): **az1597-all.pdf**





"Plant Kit" is completed by Arizona Farm Bureau and is in use by teachers

An educational curriculum kit featuring grains, which was proposed and sponsored by AGRPC and developed by Arizona Farm Bureau (AZFB), is now in use by grade school teachers in Arizona. The kit meets "Agriculture in the Classroom" (AITC) program standards, says AZFB's Katie Aikins, who devoted countless hours to the kit's development. AITC teaches English, math, science and social studies through agriculture. THANKS, KATIE!

AGRPC helped find donated kit materials such as grain seeds, wheat spikes, educational pamphlets, and "Gem of the Southwest" videos and has annually provided financial aid to resupply disposables for all curriculum kits maintained by AZFB.

How much does producing small grains contribute to Arizona's economy?

AGRPC-funded U of A study estimates $200-300 million to be the annual economic value of producing AZ's barley and wheat crops

Note: The AGRPC funded a grant proposal submitted by Dr. George Frisvold, Extension Specialist & Professor, Department of Agricultural and Resource Economics, CALS, University of Arizona. This article presents portions of the study's findings. The complete version is available on the website of the Arizona Department of Agriculture or from the AGRPC's executive director.

Barley and wheat are significant contributors to Arizona's agricultural industry and economy for several reasons and they are grown for a range of customers, both domestic and foreign. Barley offers a local source of feed grain for a severely feed-deficient Arizona livestock production sector. Durum, Arizona's most commonly-grown wheat market class, is widely recognized for its consistently favorable grain qualities, for its efficient milling qualities, and for the attributes of color and firmness that it imparts to pasta. These small grains are important components of field crop rotations for some growers; this is especially true of durum grown in rotation with produce in southwestern Arizona.

The contribution of small grains production to Arizona's economy goes beyond the direct effect of the dollar value of grain harvested from the fields. Grain production requires inputs of goods and services, many of which are supplied by local businesses. These local businesses, in turn, require their own production inputs. These rounds of business-to-business transactions that provide inputs are known as indirect effects. Incomes generated in small grains production (farm profits, wages, salaries) are also applied to household expenses, such as rent or mortgages, doctor visits, and groceries that produce more rounds of household-to-business transactions, known as induced effects. Because of these indirect and induced multiplier effects, the economic contribution of small grains in Arizona is considerably greater than indicated by farm gate sales figures.

What did the study find?

- In 2014, based on the latest official USDA statistics available, Arizona's small grains industry had direct output (farm gate sales) of $103 million and a total economic contribution of $206 million in output to the state's economy.
- The small grains industry supported a total of 1,485 jobs, consisting of 814 jobs directly related to grain production and 671 jobs in supporting industries.
- Because agricultural production and prices are highly variable, estimates of direct effects and total agribusiness economic contributions can fluctuate significantly from year to year. In 2015, both total small grains production and prices increased over 2014 levels. Therefore, direct farm gate output rose from $103 million in 2014 to over $150 million in 2015. The model used in this study (calibrated to represent Arizona's economy as of 2014) was also used to estimate the multiplier effects of the 2015 small grains crop. Accounting for multiplier effects (based on 2014 relationships), the total contribution of small grains production to Arizona's economy in 2015 was $300 million.
- While wheat and barley occupy in the range of about 12% to 20% of the state's annual crop acreage, their combined "state receipts" or farm gate value of $103 million ranked well behind that of miscellaneous crops (totaling $526 million), lettuce ($377 million), hay ($288 million), upland cotton lint ($197 million), and lemons ($137 million) in 2014, according to the USDA's Economic Research Service. In fact, the combined 2014 receipts of all of Arizona's crops were less than that of the livestock and dairy sectors.
- Yuma County's annual durum wheat acreage typically ranks it among the top 10% of U.S. counties in that statistic.
- The economic contribution of the small grains industry was estimated using the 2014 IMPLAN Version 3.1 input-output model. The IMPLAN model captures the linkages between economic sectors in a particular region and is used to understand how specific industries or economic events affect the regional economy overall. While IMPLAN has data built into the model, modifications were made to the IMPLAN data to more accurately capture the economic contribution of Arizona's small grains industry cluster.

Desert Durum® now describes a whiskey that is distilled from its wheat grain

Arizona growers and the world of flour milling have recognized Desert Durum® as a premium grain that is milled into semolina flour for making world-class pasta for three decades. Now, all parties are being introduced to a product that carries the same name but no other resemblance to grain – Desert Durum® Wheat Whiskey. The beverage is distilled from mash made 100% from Desert Durum ® grain grown in central Arizona, according to the distillers, and has already won some awards during its short existence.

Arizona Distilling Co. of Tempe was awarded trademark protection by the U.S. Patent and Trademark Office in May 2015 for use of the term to describe distilled spirits. The company, formed in 2012, is owned and operated by two long-time Arizona residents: Jason Grossmiller grew up in Pinal County and Jonathan Eagan arrived in Arizona over 25 years ago.

The firm "… is committed to sharing Arizona with the world" according to its website. The company also distills malt and rye whiskeys, vodka, gin, and a white whiskey. All are distilled from grains produced in Arizona and have won a variety of bronze, silver and gold medals in spirits competitions. Desert Durum® Wheat Whiskey has earned silver medals in at least two such competitions, including a world spirits competition in San Francisco in 2015.

Eagan says that the business's objective from the beginning has been to utilize distilling resources produced in Arizona and that distilling whiskey from Desert Durum® was practically a "no-brainer" given the grain's high profile identity and they are pleased that the product is unique enough to earn awards as quickly as it has. Their Desert Durum ® Wheat Whiskey was publicized in the December 2015 issue of *Edible Phoenix* magazine.

Research reports - 2016 growing season

Note: All 2016 growing season reports were submitted by scientists in the College of Agriculture and Life Sciences at the University of Arizona. Reports 1, 3, 4, and 5 were submitted jointly by Dr. Mike Ottman, Extension Agronomy Specialist and Professor, CALS, Tucson and Dr. Rick Ward, Bud Antle Endowed Chair, CALS, Maricopa Ag Center. Dr. Ottman submitted Report 2.

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1) Evaluation of Palisade® as a plant growth regulator in durum

Lodging can present problems in small grain production, often contributing to increased disease severity, reduced grain yield and quality, and reduced harvest efficiency. Palisade® is a relatively new plant growth regulator that has shown some promise in reducing lodging. The effect of Palisade® on height and lodging of durum, and subsequent grain yield and quality was tested in a study in 1,200 sq ft plots at the Maricopa Ag Center.

Plant height was not affected by Palisade® since the chemical was applied at boot when the plant was near maximum height, one stage past the recommended stage. However, lodging was reduced from 83 to 61% and 28 to 8% under high and medium input growing conditions of water and N fertilizer, respectively. Grain yield significantly increased from 4,481 to 6,152 lb/acre and 5,600 to 7,330 lb/acre under high and medium input growing conditions, respectively. Harvest index, test weight, seed weight, HVAC, grain protein, or heading, flowering, and maturity dates were not significantly affected by Palisade® application in this study.

Palisade® is effective in reducing lodging but not eliminating it and can have a significant but inconsistent effect on yield. However, the potential benefit of applying Palisade® suggests that it is likely worth applying this chemical to wheat if lodging is anticipated.

2) Small grains variety evaluation at Maricopa

Small grain varieties are evaluated each year by University of Arizona personnel. The purpose of these tests is to characterize varieties in terms of yield and other attributes. Variety performance varies greatly from year to year and several site-years are necessary to adequately characterize the yield potential of a variety. A summary of small grain variety trials conducted by the University of Arizona can be found online at this URL address: *http://ag.arizona.edu/pubs/crops/az1265-2016.pdf .*

3) Late season N application method effect on durum grain protein

Nitrogen (N) fertilizer is normally applied around flowering time to boost grain protein content. The purpose of this study was to determine if the grain protein boost provided by late N application can be influenced by physical method of application.

A trial testing late season N application methods on three durum varieties was conducted on 3/4-acre plots at the Maricopa Ag Center. A total of 211 lb N/acre was applied before flowering, when 35 lb N/acre was applied as (1) UAN32 in the irrigation water (fertigation), (2) low biuret urea in a foliar application, or (3) urea granules, with a zero N check.

Averaged over all three varieties, this study observed no significant differences in grain protein content or any other variable measured that could be attributed to the late N application method. However, a 0.4% increase in grain protein was observed due to the late application compared to the control receiving no late N, regardless of late N application method.

4: Can yield of late-planted small grains be compensated by water and nitrogen rates?

Wheat and barley are often planted later than optimum due to the timing of the previous crop or to reduce the risk of frost damage. It may be possible to partially compensate for lower yield potential of late plantings by increasing water and nitrogen rates beyond what would have an effect at more optimal plantings. The objective of this study was to evaluate the effects of nitrogen and water rates on late-planted wheat and barley.

A trial testing low, medium, and high water and nitrogen (N) application rates on barley and durum wheat (one variety of each) planted on optimum (December 7) and post-optimum (February 1) dates was conducted on 3/4-acre plots at the Maricopa Ag Center.

Higher levels on inputs of water and N did not increase yield at later planting dates, as was hypothesized for this study. The highest yields were obtained at medium inputs of water and nitrogen, regardless of planting date. The yields of the later planting date were not depressed as expected due to unusually mild temperatures that prevailed in the spring, which favored the later planting date

5: Clipping small grains to increase grain yield

Wheat is commonly grown as a dual purpose crop in the Southern Great Plains, where the early vegetative growth is grazed before maturing into a grain crop. In Arizona, clipping a crop planted in October may increase tillering and grain yield. Grazing can be detrimental to the subsequent grain crop if extended into the stage where the growing point is compromised. However, properly-managed grazing may have negligible to positive effects on subsequent grain yield. The potential advantage of such dual purpose management is a net revenue increase from the combined yields of forage and grain. The hypothesis for this study was that clipping would increase tillering of grain crops, with increased grain yields adding to revenue generated by the vegetative clippings.

A trial was conducted on 3/4-acre plots at the Maricopa Ag Center, where several varieties of barley and wheat were planted on October 12, 2015, cut for forage on January 3, 2016, then allowed to go to grain and compared with uncut plots planted on December 3, 2015. No differences in grain yield were detected between the planting dates when averaged over all varieties. However, larger kernels, higher grain protein, and higher stem density were observed from the October 12 planting with clipping. The income from the sale of the forage was $99/acre based a yield of 2,639 lb/acre and a forage value of $75/ton. The added cost per acre to produce this forage included $29 for water (6.27 inches water at $55/acre-ft) plus $34 for fertilizer (50 lb N/acre of urea at $433/ton). Therefore, even though no grain yield effect was observed from planting early and clipping, a net revenue increase of $36/acre was realized from the sale of the forage.

California Wheat Commission finds new executive director on own staff

Claudia Carter was named Executive Director of the California Wheat Commission (CWC) in June 2016 after serving as Director of CWC's Milling and Baking Lab since June 2014, a role she will continue to fill. Carter's charge in this new role is to further the Commission's purpose, which is to support research that improves California wheat quality and to develop and maintain domestic and international markets. The CWC was created in 1983 and is located in Woodland, near the University of California, Davis.

Carter is a native of Ecuador who began her professional education studying food engineering in Argentina. She arrived in the U.S. in 2008 to continue her studies at North Dakota State University (NDSU) in Fargo, where she earned a B.S. in Food Science and an M.S. in Cereal Science. While in school, she spent two years as a food technology specialist in NDSU's Durum Quality Lab.

The CWC and Carter work closely with farmers, grain handlers, wheat breeders, and millers and bakers in support of its mission and charge to use grower check-off funds in support of California's wheat producers. She provides consulting and on-site training for customers interested in learning about wheat quality, including milling, baking, pasta extrusion, and other quality traits and is an active member of American Association of Cereal Chemists International and the Bread Bakers Guild of America.

Long-serving Cotton Growers Ass'n exec Rick Lavis loses battle with cancer

Rick C. Lavis, 76, who represented and advocated for Arizona's cotton growers and Arizona agriculture in federal, state, and local arenas for 36 years, passed away on November 26, 2016 after a lengthy battle with cancer.

As Executive Vice President of the Arizona Cotton Growers Association from 1980 until his passing, Lavis exerted significant influence in political and policy affairs that affected the cotton industry at all government and industry levels, according to long-time colleagues. He was a forceful spokesman for legislation and rulemaking covering issues affecting all aspects of Arizona agriculture – water, pesticides, equipment use, taxes, and more.

Lavis was very active in organizing and leading the wheat industry's responses to federal regulatory actions that were imposed following the discovery of Karnal bunt in Arizona in 1996.

Aside from his professional responsibilities specifically related to cotton, Lavis was involved in dozens of civic and educational organizations, boards and public service endeavors in the Phoenix area.

Lavis was not a native of Arizona, moving to the Phoenix area with his parents in 1946. He earned a B.Sci. in Political Science from ASU and studied and taught American Government at the U of A. He learned some of his lobbying skills while working on Capitol Hill in D.C. before returning to Arizona. He is survived by his wife, Marti, and two sons and their families.

AGRPC and CWC share common interests, resources, and responsibilities

Wheat producers in Arizona and California are physically separated by a river; nevertheless, many of them deal with similar challenges and issues in growing and marketing their grain. Desert Durum®, in particular, has earned a global reputation for reliable quality and supply whereby customers rarely seek to distinguish between geographical sources of the crop. While the dominant wheat-growing characters of the two states differ markedly, the California Wheat Commission and the Arizona Grain Research and Promotion Council have long collaborated in seeking to support their respective and common producer interests.

One of those joint exercises has been, and continues to be, stewardship of the terms Desert Durum®. The two organizations initially gained legal recognition of the terms in the mid-1990s and have jointly carried out annual Desert Durum® crop quality surveys for over 20 years, with the CWC analyzing the samples and publishing the results for domestic and international distribution. AGRPC has aided the effort through occasional donation of equipment to the CWC lab and providing lab analyses business.

The newest joint responsibility is the shared ownership of the registration of Desert Durum® as a "certification mark" as recognized by the U.S. Patent and Trademark Office in June 2016. Now, the two groups are empowered to authorize parties to use the mark to identify grain that meets the definition in the registration certificate. Furthermore, they are obligated to "police" its proper (or improper) use.

Californiawheat.org

As an organization that maintains an office and a full-time staff, the CWC has the means to maintain a website in support of its activities. In addition, the site contains links to many sources of technical and promotional information about wheat. CWC has kindly posted some material originating from the AGRPC and, presently, is the home of *DesertDurum.com*. AGRPC is financially supporting the ownership of this address as well as *DesertDurum.org* and *DesertDurum.net*. All of these addresses take one to *www.californiawheat.org*. There, the "News/Info" tab brings up some information about Arizona and Desert Durum® and CWC's newsletter, which is published quarterly.

Desert Durum® Grain Production in Crop Years 2014-2016 and Export Volumes in Marketing Years (MY) 2015 -2016

The following figures were derived from reports of the USDA/NASS, USDA/GIPSA, and the CDFA. Figure are in Metric tons (2,205 lbs).

Production	**2014**	**2015**	**2016**
Arizona	229,551	412,245	256,000
So. California	*45,000	*87,000	*75,000
Total	**274,551**	**499,245**	**331,000**

**Estimated*

MYs ending on 5/31

Exports to:	**2015 MY**	**2016 MY**
Italy	126,000	236,470
Nigeria	16,317	35,796
Japan	0	1,494
Panama	0	1,308
Total	**142,317**	**275,068**

United States of America
United States Patent and Trademark Office

Desert Durum

Reg. No. 4,976,449

Registered June 14, 2016

CERTIFICATION MARK

PRINCIPAL REGISTER

CALIFORNIA WHEAT COMMISSION (CALIFORNIA STATE AGENCY)
1240 COMMERCE AVENUE, SUITE A
WOODLAND, CA 95776 AND

ARIZONA GRAIN RESEARCH AND PROMOTION COUNCIL (ARIZONA STATE AGENCY)
1688 W. ADAMS STREET
PHOENIX, AZ 85007

FOR: WHEAT GRAIN AND THE SEEDS PRODUCING SUCH GRAIN , IN CLASS A (U.S. CL. A).

FIRST USE 0-0-2012; IN COMMERCE 5-4-2015.

THE MARK CONSISTS OF STANDARD CHARACTERS WITHOUT CLAIM TO ANY PARTICULAR FONT, STYLE, SIZE, OR COLOR.

OWNER OF U.S. REG. NO. 2,238,997.

NO CLAIM IS MADE TO THE EXCLUSIVE RIGHT TO USE "DURUM", APART FROM THE MARK AS SHOWN.

THE CERTIFICATION MARK, AS USED OR INTENDED TO BE USED BY PERSONS AUTHORIZED BY THE CERTIFIER, CERTIFIES OR IS INTENDED TO CERTIFY THAT THE GOODS PROVIDED ARE AT LEAST 90% WHEAT GRAIN PRODUCED UNDER IRRIGATION IN THE DESERT VALLEYS AND LOWLANDS OF ARIZONA OR CALIFORNIA.

SER. NO. 86-637,780, FILED 5-21-2015.

TIMOTHY O. SCHIMPF, EXAMINING ATTORNEY

Michelle K. Lee

Director of the United States
Patent and Trademark Office

Durum

Duraking is a high-yielding variety with excellent lodging resistance.

Havasu is an early maturing variety with high test weight.

Helios is an early maturing variety with good lodging resistance, color and milling characteristics.

Kronos is an early-maturing variety with large grain size.

Orita is a full season variety with excellent lodging resistance and high grain protein content.

Platinum has short stature and good lodging resistance.

Tiburon is a late-maturing variety with excellent lodging resistance, large grain size, and high protein.

WB-Mead is a high yielding, tall, late maturing variety with excellent lodging resistance and high test weight and grain protein.

WB-Mohave is a high-yielding variety with high test weight and grain protein.

Westmore HP is similar to Kronos except it has higher protein, smaller kernels, and better semolina color.

Barley

Baretta is a full-season, high-yielding variety.

Chico is a full-season variety with excellent lodging resistance.

Cochise is a short-season and short-statured variety.

Kopious is a short-season, high-yielding variety with excellent lodging resistance.

Nebula is a full-season variety.

Wheat

Joaquin is a very high yielding variety taller than Yecora Rojo but similar in protein and maturity.

WB-9229 is a high protein variety with good yield potential and is taller and later than Yecora Rojo.

WB-Joaquin Oro is a high protein variety taller and earlier than Yecora Rojo.

Yecora Rojo is an early-maturing variety with stable yields and adequate quality characteristics.

COLLEGE OF AGRICULTURE & LIFE SCIENCES
Cooperative Extension

Wheat and Barley Varieties for Arizona 2016

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, College of Agriculture Life Sciences, The University of Arizona.

COLLEGE OF AGRICULTURE & LIFE SCIENCES
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Extension Agronomist

AZ1265
Revised 11/16
extension.arizona.edu/pubs/az1265-2016.pdf

This information has been reviewed by university faculty.

Summary of Small Grain Variety Characteristics for Arizona (2016)[1]

Variety	Seed source	Grain yield	Test weight	Seed weight	Plant Height	Lodging	Heading	Maturity[2]	Grain protein	HVAC
		lbs/acre	lbs/bu	g/1000	inches	%	date	date	%	%
BARLEY										
Baretta	Arizona Grain	6493	52.0	44.5	31.1	16	3/21	4/30	11.6	•
Chico	Barkley Seed	6180	51.8	37.4	27.5	0	3/20	5/01	11.2	•
Cochise	Barkley Seed	6103	52.1	38.0	29.9	14	3/13	4/26	11.3	•
Kopious	Arizona Grain	6433	52.7	43.6	29.7	2	3/14	4/26	11.6	•
Nebula	Barkley Seed	6196	52.6	46.7	32.6	13	3/19	4/29	12.2	•
DURUM										
Duraking	Dunn Grain	7008	63.3	46.7	34	8	3/27	5/07	13.0	98
Havasu	Barkley Seed	6576	63.8	51.4	35	25	3/25	5/05	13.6	98
Helios	Arizona Grain	6665	63.1	46.7	35	15	3/22	5/04	13.1	97
Kronos	Arizona Grain	6541	62.7	53.9	35	33	3/23	5/04	13.4	97
Orita	Barkley Seed	6758	61.6	52.3	35	8	3/30	5/07	14.4	98
Platinum	Dunn Grain	6636	62.6	44.2	32	12	3/27	5/06	13.1	98
Tiburon	Arizona Grain	6674	62.1	56.3	34	9	3/27	5/07	14.0	97
WB-Mead	Barkley Seed	6932	62.4	47.0	36	6	4/01	5/09	13.9	99
WB-Mohave	Barkley Seed	6904	63.2	49.5	35	22	3/26	5/06	14.0	99
Westmore HP	Arizona Grain	6568	62.5	43.5	34	43	3/24	5/05	14.1	99
WHEAT										
Joaquin	Barkley Seed	7039	63.7	43.7	35	9	3/22	4/29	13.7	98
WB-9229	Barkley Seed	6681	64.4	38.8	35	6	3/28	5/02	14.4	97
WB-Joaquin Oro	Barkley Seed	6503	63.1	42.3	35	0	3/20	4/26	14.9	98
Yecora Rojo	Barkley Seed	6224	62.6	44.4	31	8	3/25	4/29	13.9	98

[1] Since not all varieties were in each test, performance was summarized using least-squares means. Most of this information is derived from trials conducted in Maricopa, Pinal, and Yuma Counties planted in late November through mid-January. Actual variety performance may differ from these results.