



## Desert Durum wheat “Desert King-High Protein (HP)”

### DEVELOPMENT

Desert King was developed at the University of California wheat breeding program by wheat breeders Dr. Jorge Dubcovsky and Oswaldo Chicaiza and lab assistant Xiaoqin Zhang. ‘Desert King-High Protein’ (henceforth, DK-HP) showed a significantly higher grain protein concentration than the original variety ‘Desert King’ (8 to 10% increase) and improved pasta quality parameters as determined at the California Wheat Commission Quality Laboratory. Funding for this project came from the University of California Discovery grant, the California Wheat Commission and the California Crop Improvement Association.

### BREEDING HISTORY AND DESCRIPTION

Desert King-High Protein is a short-stature spring durum variety with erect leaves and excellent lodging resistance. This variety was developed by five backcrosses of the high grain protein content gene *Gpc-B1* from wild wheat into Desert King followed by agronomic selection. The original **Desert King** is a widely grown Desert Durum variety developed by the University of California Wheat Breeding program. It has very high yield potential, low black tip incidence, and excellent pasta quality. The *Gpc-B1* gene present in wild wheat is functional whereas the form present in Desert King and other commercial durum cultivars is not functional. The replacement of the non-functional copy by the functional one, increases grain protein content by approximately 10% and accelerates grain maturity 5-8 days. The *Gpc-B1* gene, discovered at Dr. J Dubcovsky laboratory in 2006 (*Science* 2006, 314:1298-1300), is very close to an additional gene for stripe rust resistance designated *Yr36*. The two genes were transferred together using molecular markers flanking both genes, increasing grain protein content and stripe rust resistance in DK-HP simultaneously.

### ADAPTATION

DK-HP was tested in the Durum Wheat Elite Trials in 2008 and 2009 and in Regional Trials in 2009 and 2010 under the UC identification number **UC1627**. DK-HP combines a high yield potential, good pasta quality, and resistance to the major wheat pathogens found in California. Its primary use is for pasta production. DK-HP performs well agronomically in all areas where it has been evaluated in California. DK-HP is well suited for the San Joaquin and Imperial Valley, the main durum producing areas in California, but has also the potential to expand the durum growing area in California to the Sacramento Valley, an area where previous varieties were unable to reach the high grain protein content levels required for high-quality pasta varieties.

### PEST AND DISEASE RESISTANCE

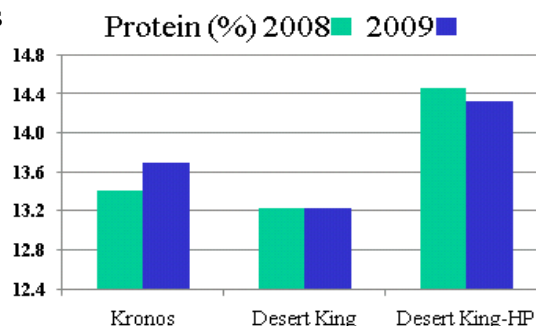
DK-HP was resistant to the current races of leaf rust, stripe rust, black point, barley yellow dwarf virus.

## AVERAGE YIELD AND PROTEIN DATA

The faster maturity of DK-HP has the potential to accelerate harvesting 5 to 8 days relative to Desert King but also results in a shorter grain filling period and an average yield reduction of 3-4% relative to Desert King (based on 5 field trials). This slight reduction in yield is compensated by an 8-10% increase in grain protein content, resulting in a net increase in total harvested Nitrogen (Table 1). Therefore, DK-HP is preferred to Desert King when higher levels of grain protein are desired, for use in blends to rich grain protein targets, or to grow high quality durum in the Sacramento Valley.

**Table 1.** Yield and Grain Protein content Davis Elite trials

Davis Elite trials 2008-2009	Yield lb/ac	Protein %
Kronos	<b>8950</b>	<b>13.6</b>
Desert King	<b>9630</b>	<b>13.2</b>
Desert King-High Protein	<b>9440</b>	<b>14.4</b>



## SEED CLASSES AND PRODUCTION

Seed classes of DK-HP are Breeder, Foundation, Registered and Certified. The University of California Foundation Seed Project, Davis maintains breeder and Foundation seed classes. Foundation, Registered and Certified seed production are each limited to 3-years. Seed production of Foundation, Registered and Certified classes is limited to California. Foundation seed is available for production of Registered and Certified seed.

## INTELLECTUAL PROPERTY PROTECTIONS

Desert King-High Protein is a public variety. It is protected under Plant Variety Protection.

## ALLOCATION AND LICENSING

Foundation seed of Desert King-High Protein is distributed by the University of California Foundation Seed Program to licensed brokers and seed houses **twice annually**, fall and spring. Off-cycle requests are considered on a case-by-case basis.

To obtain information and/or a license for Desert King-High Protein contact the University of California, UC Davis InnovationAccess:

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