

Registration of 'Giza 2000' Drought-Tolerant Six-rowed Barley for Rainfed and New Reclaimed Areas in Egypt

'Giza 2000' six-rowed barley (*Hordeum vulgare* L.) (Reg no. CV-330, PI 642787) is a drought-tolerant spring cultivar developed by the Barley Research Department, Agricultural Research Center at Giza, Egypt, and released in October 2003. It was selected for its high yielding potential under rainfed conditions and in the newly reclaimed lands in Egypt. These lands are located west of Delta Region in the desert and have been reclaimed and used for growing drought-tolerant crops such as barley.

The pedigree breeding method was used for development of Giza 2000. It originated from the cross between the Egyptian local cultivar Giza 121 and the line 366/13/1 (Giza 117/Bahteem 52//Giza 118/FAO 86). Giza 121 is an Egyptian local cultivar used for over 10 yr as a drought tolerant cultivar, while Line 366/13/1 is a promising line developed under drought stress conditions in the Northwest Area of Egypt. It was selected for early maturity, yielding stability, and high yielding potential under drought stress conditions. Plant selection within superior F₄ families were made and seed from these plants were grown as F₄ plant rows at the Sakha Research Station in the northern Delta Region of Egypt. Spikes from superior families were selected and grown as plant rows for rouging and purification purposes, after which only the best appearing and most uniform lines were combined and carried forward to the next generation for yield tests.

The first yield trials of Giza 2000 were conducted in 1998/1999 growing season at six locations: Sakha, Nubaria, El-Mathani, El-Negela, El-Goura, and Rafah. These locations are representative of most rainfed areas and newly reclaimed lands in Egypt. Giza 2000 was further evaluated in replicated preliminary multilocation yield trials grown under different environmental conditions in Egypt. In these trials, Giza 2000 was significantly ($p \leq 0.05$) superior to the commercial national check cultivars, Giza 123 and Giza 126 in grain yield. Subsequently, Giza 2000 was included in large-scale yield trials and in demonstration experiments conducted in farmers' fields along with the national check Giza 123. On average, in 3 yr of testing in Egypt (about 18 environments) Giza 2000 significantly ($p \leq 0.05$) outyielded Giza 123 in grain yield by about 17.3%. Average yields of 1010 kg ha⁻¹ were obtained for Giza 2000 under severe drought stress in the rainfed areas of Egypt, outyielding the drought tolerant cultivar Giza 126 by about 154 kg ha⁻¹ (15.2% increase). In addition to its yield advantage, Giza 2000 had significantly ($p \leq 0.05$) higher 1000-kernel weight than the check cultivar, Giza 123, ranging from 40 to

42 g. Average data of nine environments indicated that head emergence of Giza 2000 occurs between 90 and 95 d from seeding, and maturity is 130 to 140 d from seeding, compared to 100 d and 140 d for Giza 123 depending on the environment (including moisture, soil fertility levels, and level of rainfall and distribution during the growing season).

Juvenile plants have an erect growth habit. The spikes are tapered, medium dense and lax. Awns are rough and longer than the spike. The rachilla is medium in length, with moderately long rachilla hairs. Glumes are hairy and about one half of the kernel in length. Stems are slightly waxy, with a medium-green color. Leaves are medium green with narrow width, averaging 16 mm. Basal leaf sheaths are pubescent and auricles are white.

Giza 2000 was tested for resistance to the major barley diseases occurring in each environment; including net blotch (caused by *Pyrenophora teres* Drechs.), leaf rust (caused by *Puccinia hordei* G. Otth), and powdery mildew (caused by *Erysiphe graminis* DC.f.sp. *hordei* Em. Marchal;syn. *Blumeria graminis* (DC.) E.O. Speer). Giza 2000 is resistant to powdery mildew and net blotch, but moderately resistant to leaf rust.

The generation sequence of seed production will be Breeder, Foundation, Registered, and Certified seed. Breeder seed will be maintained at the Agricultural Research Center at Giza and foundation seed is maintained at the Sakha and Gemmeiza Research Stations (northern Delta). Seed of Giza 2000 is being increased at two experimental stations in Egypt for dissemination to farmers. Seed will be available from the Barley Research Department, Agricultural Research center, Giza, Egypt.

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