



## A REVISION OF THE GENUS *Triticum* L. IN EGYPT

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### ABSTRACT

This study was conducted to revise the taxonomic identity and clarify specific relationships among the studied *Triticum* species in Egypt. The studied species included; *T. dicoccum* (Schrank) Schubl.; *T. dicoccoides* (Koren ex Asch. & Graebn.) Aaron Sohn. *T. turgidum* L.; *T. durum* Desf.; *T. pyramidale* (Delile ex Schult.) Percival and *T. aestivum* L. Moreover, the wild Emmer Wheat *T. dicoccoides* (Koren ex Asch. & Graebn.) Aaron Sohn was recently found in Egypt as a new record. The genus *Triticum* L. includes 14 species, all of them are cultivated for food except the wild Emmer.

### INTRODUCTION

Gramineae is one of the largest families of flowering plants. It includes about 620 genera and 10,000 species Clayton & Renvoize, (1986). In the Egyptian flora, Gramineae is represented by 93 genera and 224 species (Täckholm, 1974), while Boulos, (2009) records 110 genera and 284 species. El-Khanagry (2004) added 6 species as new taxa to the flora of Egypt. The genus *Triticum* includes 15 species worldwide according to Huller (1995). Townsend *et al* (1968); Davis *et al* (1985); Naomi (1986) and Boulos (2005) classified and described this genus. All species of *Triticum* are cultivated except the wild Emmer Wheat *T. dicoccoides*.

### MATERIAL AND METHOD

The specimens were collected by El-Khanagry from Egypt and are kept in the Herbarium of Flora and Phytotaxonomy Researches Department

(CAIM), Egypt. The duplicates of this specimen were identified by T.A. Cope at Royal Botanical Garden, Kew, England. The key and the descriptions of the genus and the species are adopted after Boulos, (2005).

### RESULTS AND DISCUSSION

All species of the genus *Triticum* L. are annuals; raceme linear or oblong, bearing single spikelets on a fragile rachis (tardily fragile or tough in cultivated species); spikelets several-flowered (rarely only one of the florets fertile); glumes oblong to ovate, shorter or rarely longer than the adjacent lemmas, coriaceous, 5- to 11-nerved, asymmetrically 1- to 2-keeled (but sometimes becoming rounded below as the grain expand), obtuse, truncate or toothed at the tip, the lateral nerves diverging into the teeth, mucronate or awned; lemmas rounded on the back or keeled near the tip similar to that of the glumes. Distribution: East Mediterranean region to Iran.

#### 1. *Triticum dicoccoides* (Koern. ex Asch. & Graebn.) Aaron Sohn

Culms erect 20-150 cm., branched at base. Lower internodes hollow; the upper ones solid, glabrous to pubescent. Sheath hairy and ciliated, ligule 1-2 mm., scarius, mouth hairy. Blade linear, acute, glabrous to nearly pubescent. Racemes awned compacted up to 10 cm. long. Rachis hairy at nodes, disarticulated at maturity, spikelet 1-2 flowered; glumes rigid awnless up to 15 mm. long with one sharp tooth up to 5mm long and leathery ciliated keel; lemma lanceolate-acute up to 11 mm. long with long awns 10-20 cm. long; palea hairy; caryopsis adherent; 2n = 28 (plate 1).

It is distributed through Western Asia, Southern and Eastern Europe. The species was collected

from Horticulture at Research Station, Faculty of Agriculture, Cairo University, Giza, Experimental plot of faba bean, 26.4.2001, and beside irrigation canals, 23.5.2002.

## 2. *Triticum dicoccum* (Schrank) Schubl.

Synonym: *T. spelta* L. var. *dicoccum* Schrank

Culms to 1 m., glabrous or pubescent at the nodes, thick-walled or solid throughout; leaf-blades scaberulous; racemes 3-10 cm., laterally firmly compressed; rachis fragile, disarticulating at the base of the internodes, these 3 mm., glabrous or shortly ciliate at the nodes and on the margins; spikelets 3(4)-flowered, only the 2 lowermost fertile; glumes (0.6)0.7-1 cm., broadly ovate, coriaceous, with a single prominent keel running into an apical tooth; awn scabrid, to 15 cm.; grain hulled, with flinty or mealy endosperm;  $2n = 28$ .

## 3. *Triticum turgidum* L.

Synonym: *T. compositum* L.

Culms to 1.7 m, smooth and glabrous throughout, thick-walled and  $\pm$  solid; leaf-blades velutinous (but this rubbing off with age); raceme nodding, 4.5-7 cm., ovate- cylindrical, sometimes branched below; rachis tough, densely ciliate, the internodes (2.5)3.5-4 mm.; spikelets 5 to 7-flowered, the lowermost 2-5 florets fertile, glumes broadly ovate, 0.8-1 cm., coriaceous, glabrous, puberulent or velutinous, keeled throughout with 2 keels, one of them prominent, ciliolate, terminating in a 1-2 mm. tooth, the other less developed; fertile lemma 1-1.3(1.4) cm., glabrous or villous towards the margins; awn scabrid throughout, 8-18 cm.; grain naked, with mealy endosperm and without a dorsal hump or ridge,  $2n = 28$ .

## 4. *Triticum durum* Desf.

Culms to 1.4 m., smooth and glabrous throughout, thick-walled, sometimes solid; leaf-blades glabrous; raceme 3-8 cm., erect, dense, laterally compressed; rachis tough, densely ciliate, the internodes 3-4 mm. long; spikelets 5(7)-flowered, only the lowermost (2)3-4 florets fertile; glumes 0.8-1(1.2) cm., broadly ovate, coriaceous, glabrous or pubescent, keeled throughout with 2 keels, one of them prominent, scaberulous, terminating in a 2-3 mm. long apical tooth, the other

weakly developed; fertile lemma 1-1.2 cm., glabrous; awn (5.5)10-15 cm, smooth below, scabrid above; grain naked with flinty endosperm and with a prominent dorsal hump or ridge;  $2n = 28$ .

## 5. *Triticum pyramidale* (Delile ex Schult.) Percival

Synonym: *T. sativum* Lam. var. *pyramidale* Delile ex Schult.

Culms to 1 m., glabrous, thick-walled, sometimes solid; leaf-blades pubescent when young; raceme 4.5-6 cm., pyramidal, broad below, tapering above, dense; rachis tough, ciliate, the internodes 2.5-3 mm.; spikelets 4-to 5-flowered, the lowermost 3-4 florets fertile; glumes 0.8-1 cm., broadly ovate, coriaceous, glabrous, or pubescent, keeled throughout with 2 keels, one of them prominent, scabrid, terminating in a 0.5-1 mm. apical tooth, the other weakly developed; fertile lemma 1-1.2 cm., glabrous; awn 9-17 cm., scabrid throughout; grain naked with mealy endosperm and a prominent dorsal hump or ridge;  $2n = 28$ .

## 6. *Triticum aestivum* L.

Synonyms: *T. hybernum* L.; *T. sativum* Lam.; *T. vulgare* Vill.

Culms to 1.4 m., smooth and glabrous throughout or faintly puberulent at the nodes, thin-walled and hollow; leaf-blades scaberulous, puberulent or glabrous; raceme (1.5)5-10 cm., erect, lax to dense; rachis tough, glabrous or ciliate, the internodes (3)4-8 mm.; spikelets 3-to 9-flowered, usually only the (2)3 lowermost florets fertile; glumes 0.6-1(1.1) cm., broadly ovate, coriaceous, glabrous, pubescent or villous, keeled in the upper part only, the single keel terminating in a 2-3 mm. apical tooth or a 0.4-1 cm. scabrid awn; fertile lemma (1)1.2-1.5 cm.; awn 4-10(12) cm., scabrid throughout, or lemma awnless; grain naked with mealy (to flinty) endosperm, smoothly dorsally curved without a hump or ridge;  $2n = 42$ .

*Triticum* species treated in this work are differentiated as follows. For *T. dicoccoides*: Spike compressed 4-10x0.7-1.5 cm.; rachis fragile, internodes 3-5mm., ciliated margin with tuft hairy up to 5mm. at each node. Spikelets 12-15mm.; compressed and appressed to rachis with (1)-2(3) flowerest. Glume 10-15 mm. with 2keel one from the mid vein produced as a sharp tooth up to 2mm.

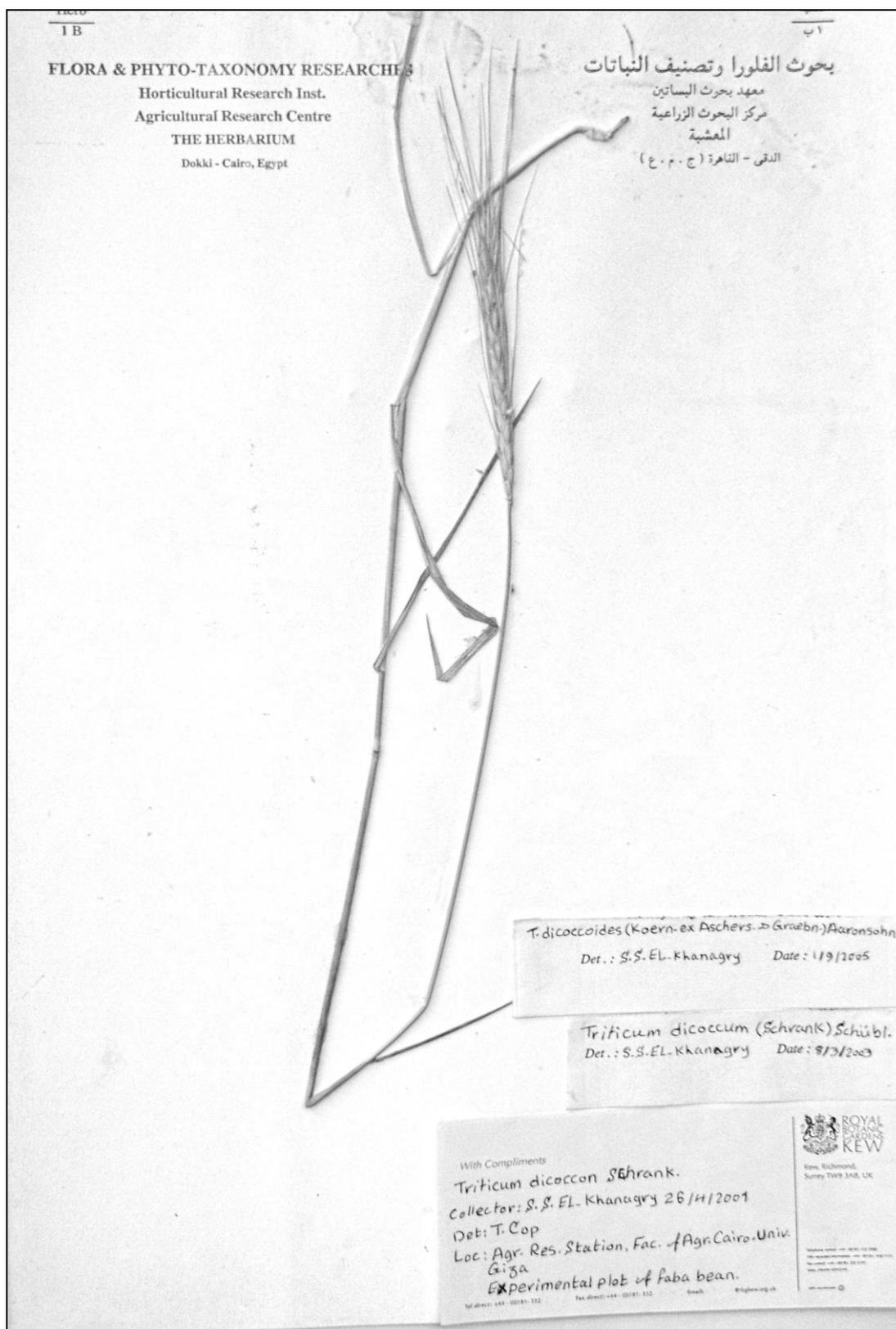


Photo 1: *Triticum dicoccoides*

Fertile lemma 10-15 mm. with awn 15-20 cm. Caryopsis 9-11×1.5-2.5 mm. adherent to lemma and palea.  $2n = 28$  **Townsend et al (1968); Davis et al (1985) and Naomi, (1986)**.

For *T. dicoccon*: spike 3-10×1-1.3 cm., laterally compressed. Rachis fragile, glabrous, disarticulating above spikelets 3-4 flowered. Glume 6-10 mm., coriaceous, with single prominent keel, lemma with awn up to 15 cm., caryopsis free  $2n = 28$  **Davis et al (1985) and Tutin et al (1980)**.

On the other hand, in *T. dicoccum*: Spike (raceme) 3-10 cm., rachis fragile, glabrous or shortly ciliate at the nodes and on the margins. Spikelet 3-4 flowered, only the two lower most fertile. Glumes 0.6-1 cm., with one sharp-tooth keel, lemma of 9×4 mm. with awn up to 15 cm.; caryopsis 7-9×2.8-3.4 mm. free  $2n = 28$  (**Townsend et al 1968**). *T. monococcum* was described by **Davis et al (1985)** as follows: spike erect 2.5-4 cm., strongly; rachis tough not disarticulating at maturity, glabrous. Spikelets 2-3 flowered usually one fertile. Glume 6-8 mm., coriaceous with two keels. Fertile lemma 8-10 mm. with awn scarbid awn 3-8 cm. Palea splitting to base at maturity. Grain free  $2n = 28$ .

Finally, El-Khanagry (2004) described *T. dicoccum* as follows: spike awned compacted, up to 10 cm. long., rachis hairy at nodes, disarticulated at maturity. Spikelet with two floret. Glumes awnless, with one sharp tooth up to 2 mm. long and leathery ciliated keel; lemma with long awn 10-15 cm. long. The specimen was identified by T. Cop as *T. dicoccon*, then El-Khanagry renamed and published it as *T. dicoccum*.

The investigator found some characters not registered such as: spikelets compact to rachis, nodes with tuft hairy up to 5mm. at the tip, caryopsis 10-2.2mm., adherent to lemma and palea. The revision of the specimens was compared with the description of species *Triticum* **Townsend et al (1968); Davis et al (1985); Naomi, (1986); El-Khanagry, (2004) and Boulos, (2005)**. Also, this species is a new record to the flora of Egypt. It was introduced to Egypt for breeding purposes and was neutralized as a weed. The investigator proposes the following key to identify *Triticum* species in Egypt as follows:

1. Raceme-rachis fragile, disarticulating at maturity ..... 2
- + Raceme-rachis tough, not disarticulating at maturity ..... 3
2. Raceme flattened ..... 1. *T. dicoccoides*
- + Raceme terete ..... 2. *T. dicoccum*
3. Glumes keeled only towards the tip ..... 6
- T. aestivum*
- + Glumes keeled from base to tip ..... 4
4. Raceme pyramidal ..... 5. *T. pyramidal*
- + Raceme oblong ..... 5
5. Leaves velutinous ..... 3. *T. turgidum*
- + Leaves glabrous ..... 4. *T. durum*

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