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NOTES ON NEGLECTED AND UNDERUTILIZED CROPS

The Corsican citron melon (*Citrullus lanatus* (Thunb.) Matsum. et Nakai subsp. *lanatus* var. *citroides* (Bailey) Mansf. ex Greb.) a traditional and neglected crop

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Abstract During a collecting mission in Corsica (France) three landraces of citron melon (*Citrullus lanatus* (Thunb.) Matsum. et Nakai subsp. *lanatus* var. *citroides* (Bailey) Mansf. ex Greb.) were collected in the northern areas. Today in Corsica this old and neglected crop is in decline and risks extinction. A strategy for its characterization and safeguarding is in progress at the genebank of IGV of Bari (Italy).

Keywords Agricultural biodiversity · Citron melon · *Citrullus lanatus* · Collecting · Corsica · Crop genetic resources

The genus *Citrullus* is taxonomically complex and its composition is not unanimously accepted by all taxonomists yet. To determine genetic relatedness among *Citrullus* and *Cucumis* species several phylogenetic analyses have been conducted (e.g. Levi and Thomas 2005; Levi et al. 2005). The genus *Citrullus* includes five (four according to some other authors, e.g. Jarret and Newman 2000) species: *C. colocynthis* (L.) Schrader, *C. ecirrhosus* Cogn., *C. naudinianus* (Sond.) Hook. [Jeffrey (2001) included this species in the genus *Acanthosicyos* naming it *A. naudinianus* (Sond.) C. Jeffrey], *C. rehmii* De Winter and *C. lanatus* (Thunb.) Matsum. et Nakai. This last one is the most polymorphic species of the genus with wild and cultivated taxa. It comprises three subspecies: (a) subsp. *vulgaris* (Schrad. ex Eckl. et Zeyh.) Fursa (Jeffrey 2001) with the most common "edible" cultivars of watermelon; (b) subsp. *mucosospermus* Fursa growing in West Africa with wild, semi-cultivated (Fursa 1972) and cultivated forms (Jeffrey 2001); (c) subsp. *lanatus* that includes the var. *caffer* (Schrad.) Mansf. ex Fursa and the var. *citroides* (Bailey) Mansf. ex Greb. (or Citroides group). The var. *caffer* is formed by wild annual plants that today grow only in the Kalahari desert but, a new archaeobotanical record raises the possibility that this distribution was much more extensive in the past (Wasylikowa and van der Veen 2004). This taxon was considered the ancestor of the present cultivated varieties by Jeffrey (1967, 2001), Zeven and Zhukovsky (1975) while, according to Navot and Zamir (1987), the var. *citroides* is regarded as their progenitor. New research using chloroplast DNA indicates *C. ecirrhosus* possibly the progenitor species (Dane et al. 2004). The cultivated and wild watermelon appear to have diverged independently from a common ancestor, possibly *C. ecirrhosus* from Namibia (Dane and Liu in press).

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The most common names of the var. *citroides* are: 'citron', 'citron melon', 'fodder melon' and 'preserving melon'. This taxon comprises old cultivars, weeds of watermelon cultivations (Jeffrey 2001) and cultivars of preserving melons and fodder melons. The fruits are used as cattle fodder and occasionally also as hogfeed, less often for the preparation of citron peel or for the production of pectin. Primitive forms grew in South Africa while some cultivars are cultivated in the USA, in the south of the CIS republics and the Polynesian islands (Hammer and Hammer 2002). In the Near East, Asia Minor and Southern Russia, it is also found as a weed in melon fields, while volunteer citron plants are commonly found scattered around old fields, orange groves and roadsides from Florida to Texas, northward to North Carolina (USA) (Stephens 2003). It is also found as weed in pinelands and other fields (Grichar et al. 2001; Hall et al. 2004).

Cultivation of watermelon began in ancient Egypt and Asia Minor (Grebenščikov 1986) and spread from there to different countries via the Mediterranean, Near East and Asia. Biogeographic patterns point to separate colonization events into Africa and the Far East (Dane and Lang 2004). As a result of prolonged cultivation and selection, new forms of table watermelon have evolved; the varieties grown today bearing little resemblance to the ancestral African forms. Cultivation of citron melon is comparatively recent and varieties of the former Soviet Union grown today still have the shape of their African ancestors (*C. lanatus* var. *caffer*). Most recent varieties of watermelon in the United States were bred from wild round-fruited African forms of *C. lanatus* (Fursa 1973).

During an exploration and collecting mission in Corsica island (France) by an Italian–German team, with the main aim to safeguard autochthonous crop genetic resources from Mediterranean islands (Laghetti et al. 2004), three landraces of citron melon were collected in three distinct sites of northern areas (Bullitta et al. 2005) while this crop was not found in the south. This material has been deposited in the genebank of the Institute of Plant Genetics of Bari (Italy) as *ex situ* seed collection, even if citron melon has shown good results as in vitro regeneration, too (Zarka et al. 2000). After its multiplication and characterisation, it will be ready for distribution to interested scientists.

The crop is named by Corsican people as 'Pateca' or 'Pastèque à confiture'. They do not eat the fruits (raw fruits are inedible) but only use them for making jams (called citre, jejerine or méréville in southern France—Pitrat and Foury 2003, p. 309) and sometimes the flesh and rind are used for making conserves and pickles. The cotyledons are ca. 1×2 cm large, ovate, thick, glossy green and with distinctive white venations on the surface. The leaves are palmate, with three to four pairs of lobes, mostly rounded with toothed margins, a rough surface, deeply divided with the tendrils that spring up to their side. The fruits observed were round to oval, 20–50 cm long, white or light green with darker green stripes and have a smooth surface (Fig. 1). The flesh is white and the many-seeded fruits are very tough and breaking-resistant. Their smell is

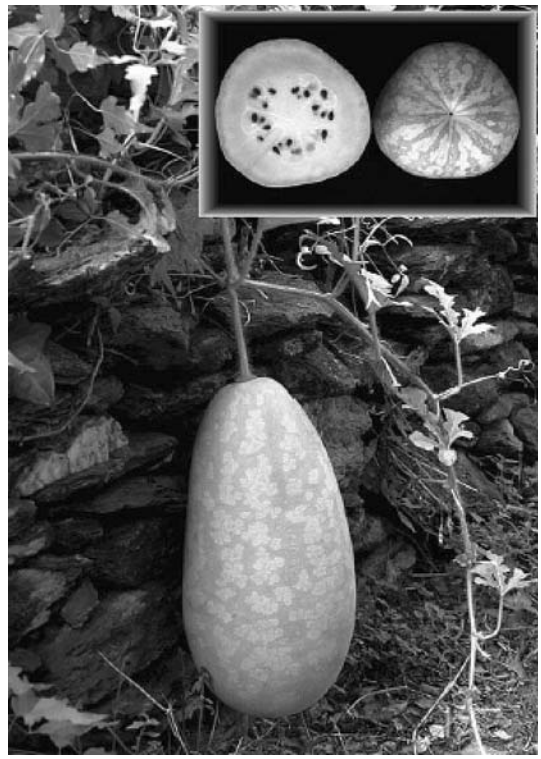

Fig. 1 Fruit of the typical Corsican citron melon locally named 'Pastèque à confiture' (photo: Cifarelli)

comparable with that of *C. lanatus* subsp. *lanatus* var. *caffer* and the greenish seeds have the same shape and size as those of the common watermelon. The low, climbing, hairy and annual plants are monoecious with solitary flowers, petals yellow and broad (3–8 mm long) and flower tubes 3–5 mm long. For pollination bees are required. Because of the close relationship to watermelon, cross-pollination between the two varieties may occur (Jarret et al. 1997) if grown side by side.

The low genetic diversity among watermelon cultivars reported by several authors (e.g. Levi et al. 2001a) emphasizes the need to expand the genetic base of cultivated watermelon. In this context citron melon, in general, has shown higher genetic variation as compared to watermelon cultivars (Levi et al. 2000), as a matter of fact, it is also important as source of useful traits e.g. resistance to *Colletotrichum lagenarium* (Fursa 1988), *Fusarium oxysporum* (Armstrong and Armstrong 1978; Fursa 1988; Mohammed et al. 1981), *Fusarium* wilt (Levi et al. 2001b; Xu et al. 1999) and gummy stem blight (*Didymella bryoniae*) (Gusmini 2003).

In some experimental trials the alkaloid Pyrazole (a precursor of some non-protein amino acids) was detected in seed extracts of watermelon cvs but not in those of citron melon (La Rue and Child 1975). For details on the importance and presence of amino acids in Cucurbitaceae seeds see Dunnill and Fowden (1965).

Fair morphologic variability among the three populations collected was observed mainly for stripes and colour of the epidermis but not for fruit shape (all oval) and seed colour (all green). A research on genetic variability of this material, compared with that one from non-Corsican origin, is also foreseen at IGV and its results might be useful to set up the best strategy for its conservation and safeguarding. As a matter of fact, nowadays in Corsica this old and neglected crop is in decline and risks extinction while, in the past, it was much more cultivated and appreciated.

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