

Evaluation of new strawberry breeding clones for organic production on a *Verticillium*-infested site in Eastern Austria

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Abstract

From 2009 to 2012, 19 new strawberry breeding clones, bred at the Institute for Breeding Research on Fruit Crops in Dresden-Pillnitz, were evaluated for their suitability for organic production on a highly *Verticillium*-infested site in Vienna, Austria, in comparison to some registered cultivars.

Plant vitality, soil cover, resistance to leaf spot diseases and flower damages by the strawberry blossom weevil (*Anthonomus rubi*) and by spring frost were recorded. Marketable yield and fruits infested by *Botrytis cinerea* were assessed in 2010 and 2011. In 2012, spring frost caused very low yields, which were only determined in selected genotypes.

As results, three breeding clones, 'P-7189', 'P-8043' and 'P-8071', are regarded as suitable for commercial strawberry production on organic farms. 'P-7189' and 'P-8143' additionally showed high tolerance to *Verticillium*-wilt. Two other breeding clones, 'P-8155' and 'P-8166', showed very good characteristics for organic production in every respect but had very soft fruits what makes them rather useless for commercial fruit production. The rest of the breeding clones had low yields, but some of them could be interesting for home gardens due to good flavour and high plant vitality. In general, the breeding clones had lower yields than the registered cultivars 'Fraroma', 'Senga Sengana' and 'Weiroma' (with exception of 'P-7189', 'P-8043' and 'P-8166'), but higher tolerance to root diseases than the susceptible cultivar 'Elsanta'.

Keywords: root diseases, flavour, home garden, resistance, tolerance

Introduction

For organic strawberry growers, the most important challenges are the infections with root and fruit diseases, weed control, adverse weather conditions and the blossom weevil (*Anthonomus rubi*) which brings the need for cultivars with high soil cover and with resistance to pests and diseases. Regarding root pathogens, *Verticillium dahliae* is the most important one in the sandy soils of Eastern Austria. However, other pathogens leading to root diseases such as *Phytophthora cactorum* and nematodes are also of importance. Differences in the susceptibility of commercially used cultivars to these root diseases are well documented, but completely resistant cultivars are not known for *V. dahliae* and *Phytophthora cactorum*. The described resistances (in the meaning of enhanced tolerance) are of quantitative nature and inherited by additive factors (Shaw *et al.*, 2008 and Shaw *et al.*, 2010). In previous experiments, we could find large differences in the tolerance of strawberry cultivars commercially used in Europe to root diseases, although the tolerance was not stable in all environments (Weissinger *et al.*, 2011).

Unfortunately, there is no strawberry breeder in Austria who develops new cultivars which are well adapted to the existing environmental conditions. On this account breeding research in Austria is mainly focused on evaluating new cultivars and breeding clones from

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foreign breeding programs to find out those getting on best with existing conditions. In this frame a number of breeding clones bred at the Julius Kuehn-Institute (JKI), Institute for Breeding Research on Fruit Crops Dresden (Germany), were tested.

Material and Methods

19 advanced breeding clones were selected in a previous screening at the experimental field at JKI due to good flavour characteristics and/or attractive fruits and due to their good plant performance at a field site highly infected by different soil borne diseases. For comparison, the cultivars 'Elsanta' (reference for a fresh market cultivar), 'Senga Sengana' (reference for a processing cultivar), 'Fraroma' (bred at JKI Dresden-Pillnitz and recommended for home gardens) and 'Weiroma' (bred at Technical University Munich, recommended for home gardens and for small-scale processing) were chosen.

In August 2009, the genotypes were planted in the research garden of the University of Natural Resources and Life Sciences (BOKU), located on the northeastern periphery of Vienna, with five replications and five plants per replication. The site was highly infested with *Verticillium dahliae* (15.8 microsclerotia/g soil). Different vegetative and generative parameters as well as fruit quality characteristics were assessed from 2010 to 2012.

Results and Discussion

'Fraroma', 'Senga Sengana' and 'P-7189' had the highest yield and also high plant vitality, but their fruits were susceptible to *B. cinerea* and in the case of 'P-7189' also to *P. cactorum*. However, 'P-7189' could be a new interesting fresh market cultivar because of the very high yield potential leading to stable yield over the years, and its large and firm fruits. 'P-8043' and 'P-8071', other interesting genotypes with fresh marketing qualities, had less yields than 'P-7189', but had a significantly lower percentage of *Botrytis*-infested fruit. In 2011, the yield of 'P-8043' was reduced by spring frost and the blossom weevil, which limited the actual high yield potential. Soil cover and plant vitality were very high, but taste was evaluated below average. 'P-8071' was rated high for its taste, but showed symptoms of *Verticillium*-wilt already after the first harvest.

'Weiroma', 'P-8155' and 'P-8166' combined plant vitality, high yield and tolerance to *B. cinerea*, but serious drawbacks of these genotypes are the low fruit firmness and the low fruit weight what makes them only suitable for home gardens or small farms for processing purposes. Regarding flavour, 'Weiroma' and 'P-8166' tasted more intensive than 'P-8155'. All other breeding clones cannot be recommended for large-scale production because of the low yield, the soft and/or small fruits. For home gardens, 'P-5357' and 'P-6737' and 'P-8086' could be interesting most likely because of high plant vitality and good taste.

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