



Genetic improvement of vegetables: development of open-pollinated cultivars

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ABSTRACT - *The estimated market value for vegetable seeds in Brazil, based on prices paid by producers, reached around R\$ 300 million in 2007. Seeds from open-pollinated cultivars accounted for only 18 %. This data clearly indicates the changeover from open-pollinated to hybrid seeds in recent decades in the main varietal segments of the Brazilian vegetable market. This lecture will outline a historical retrospective of the pioneer activities of genetic improvement of vegetable crops targeting open-pollinated cultivars in breeding programs conducted by the public universities and research institutes and their impact on the development of the Brazilian horticulture. The current situation, challenges and future prospects will also be discussed.*

Key words: *olericulture, hybrid seed, breeding, tropical agroecosystems.*

INTRODUCTION

Vegetables are produced in different agroecosystems across the national territory, mainly in the conventional tillage system. However, in recent years, there has been a significant shift to differentiated cultivation systems, particularly to protected environment and agroecological production systems.

Since the late 1990s, the production chain of vegetables in Brazil has steadily developed owing to investments in technological innovation in cultivation systems of the main crops and to the increased access to machinery, inputs, and modern equipment. Consequently, there was a marked improvement in the field, with increased productivity of most vegetables, particularly of tomato, potato, onion, carrot, melon, watermelon, strawberry, sugar beet and brassica. This evolution is evident in a comparison

of the Brazilian vegetable production between 1998 and 2008. In 1998, 11.5 million tons were produced in an area of 78,000 hectares. Ten years later, production and area had reached 19.3 million tons on 808 hectares, respectively, representing 12.4 % of the GDP of the Brazilian agribusiness, with R\$ 163.5 billion. However, the most remarkable fact is that even with an increase in acreage of only 3.8 %, production and productivity increased by 68% and 62 %, respectively (Melo et al 2010).

One of the reasons that can explain the extraordinary growth in production and productivity of most vegetables grown in the country is related to the consolidation of the production frontiers in São Gotardo, MG, Cristalina, GO and Chapada Diamantina, BA, established in the 90's. In other vegetable-production areas, as in the South of Minas Gerais, the growth since the past decade was also remarkable.

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One of the characteristics that differentiate horticulture from other agribusiness sectors, mainly from grain crops, is the fact that vegetables represent a most diverse plant group, comprising more than 100 species grown on a temporary basis. However, only eight species (potato, tomato, onion, sweet potato, carrot, garlic, melon and watermelon) account for approximately 66 % of the entire production.

The estimated market value of vegetable seeds, based on prices paid by producers, reached around R\$ 300 million in 2007. The different market segments of tomato, onion, lettuce, watermelon, sweet corn, carrot, pumpkin, coriander, sweet pepper, melon, cauliflower, and cucumber accounted for 85 % of the total seed market. In this group of vegetables, seeds from open-pollinated cultivars accounted for only 18 %, while hybrid seed represented 82 %. However, in terms of commercial seed volume, open-pollinated varieties account for 92.6 % and the hybrid for only 7.35 %. These data clearly show the high value of hybrid seeds and at the same time indicate, unequivocally, the changeover from open-pollinated to hybrid seeds in recent decades in the main sectors of the vegetable market.

Indeed, except for vegetable species for which hybrid seed production is not economically and/or technically feasible (e.g., lettuce, peas, green bean, coriander, parsley and some others), the market for open-pollinated seed was explored by small national companies only. This change has widened dramatically from the 1990's on, with the entry of transnational corporations in the Brazilian vegetable seed market. Another cause for this change may be the drastic reduction in activities of national public programs for vegetable improvement, which had always focused on new open-pollinated cultivars (Costa 2000, Costa 2007 and Melo et al 2009).

This lecture will outline a historical retrospective of the pioneer activities of genetic improvement of vegetable crops targeting open-pollinated cultivars in breeding programs conducted by the public sector and their impact on the development of the Brazilian horticulture. The current situation, challenges and future prospects will also be discussed.

Melhoramento genético de hortaliças: desenvolvimento de cultivares de polinização aberta

RESUMO - O valor do mercado de sementes de hortaliças no Brasil, em 2007, foi estimado em R\$ 300 milhões a nível de produtor. Sementes de cultivares de polinização aberta das diversas espécies de hortaliças cultivadas representaram apenas 18 %. Este dado indica claramente a mudança ocorrida nas últimas décadas nos principais segmentos do mercado de hortaliças do Brasil com a substituição de sementes de polinização aberta por sementes híbridas. Esta palestra irá traçar uma retrospectiva histórica das atividades pioneiras de melhoramento genético de hortaliças visando cultivares de polinização aberta, em programas de melhoramento conduzidos por universidades públicas e institutos de pesquisa e seus impactos sobre o desenvolvimento da olericultura brasileira. A situação atual, desafios e perspectivas de futuro também serão discutidas.

Palavras-chave: olericultura, híbrido, melhoramento, agroecossistemas tropicais.

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