

Seed Saving and Selection for Peppers

Summary

Peppers are native to Central and South America, and have rapidly diversified as they traveled to the Caribbean, Asia and Southern Europe to be adapted to local taste, cuisine, and environmental conditions and for the use of their fruits as food, condiments, spices, or as medicine. In some places like Spain, their cultural value has become so important that many cultivars have received protected designations of origins.

There are many species of peppers or chiles (*Capsicum* spp.), but only five are regularly cultivated. The most common is *Capsicum annuum*, which includes sweet peppers, the elongated *corno di torro* Carmen types, and many common hot pepper varieties (ex: Paprika, Cayenne, Jalapeño, Poblano, Serrano). The other families in the *annuum* complex include the *C. chinense*, like the Habanada, Carolina Reaper and Scotch Bonnet, and the *C. frutescens* (ex: Tabasco pepper). Finally, the *C. baccatum* (ex: Aji amarillo) and *C. pubescens* (ex: Rocoto) are part of two distinct *Capsicum* complexes, the latter being distinguishable by its black seeds.

Historically, breeding efforts have emphasized rapid inbreeding for hybrid production, as well as adapting peppers to greenhouse production and introducing new disease resistances from their wild relatives¹. Today, large-scale, commercial seed production is mostly specialized in south east Asia and northern Chile²

With cultural as well as local food gaining in popularity in Canada, peppers have attracted a large following of consumers, chefs and amateur breeders who love the pepper's spectrum of potency, floral flavor and versatile use in traditional and contemporary cuisine³.

Regional adaptation of peppers is important to farmers in Canada, with bell peppers being identified as a priority crop for breeding for organic farming⁴. As a tropical plant, maturity and yield can be a challenge, and tolerance to mutating diseases and migrating insects in the summer and to cold in the fall still need improvement. Among the five species of cultivated peppers, the most widely known, the *Capsicum annuum*, can be grown in our short season the most reliably. Farmers direct marketing their produce to consumers and restaurants are also interested in growing varieties that are richer in pigment, flavour, and vitamins.

Peppers are generally considered as self-pollinating plants, but they actually do naturally cross-pollinate depending on the local conditions (plant density, pollinators, etc.). The

¹ Doré, C. and Varoquaux, F. Histoire et amélioration de cinquante plantes cultivées. 543-556.

² Navazio, J. (2012). The Organic Seed Grower. 307-315

³ Lillywhite, J. et al. (2013). Spicy Pepper Consumption and Preferences in the United States. *American Society for Horticultural Science*.

<https://journals.ashs.org/horttech/view/journals/horttech/23/6/article-p868.xml>

⁴ Bauta Family Initiative on Canadian Seed Security (2018). Survey Report Canadian Organic and Ecological Plant Breeding Priorities <http://www.seedsecurity.ca/en/programs/create/vegetable-crops>

Capsicum crossability matrix provides more detail on this topic⁵. Indeed, varieties within the three subspecies in the *annuum complex* - the *C. annuum*, *C. chinense* and *C. frutescens* - will cross-pollinate prolifically and produce viable seed, while other pepper species will not cross as easily.

Hot peppers and older cultivars tend to have elongated styles, which are more prone to cross-pollinate. This tends not to be the case with more modern cultivated varieties. This means that ensuring proper isolation is an important part of the work of seed growers. While hand pollination is an option to undertake multiple crosses with multiple parents, it is more easily done in a greenhouse or in a tunnel. In the field, one can plant two varieties close to another and let natural cross-pollination occur. For maintenance and selection purposes, grow at least 25 plants, keeping 75 to 150 ft distance for sweet peppers, and 150 to 300 feet distance for the hotter varieties.²

For more information:

- The stories behind the [Fish Pepper](#), the [Carolina Reaper](#) and the [Habanada](#)
- [Listing of pepper varieties](#) and an [illustrated Scoville Scale](#)
- Examples of Capsicum Crossability Tables ([here](#) and [here](#))
- Instructional videos on pepper pollination by [Johnny's Selected Seeds](#) and the [University of Wisconsin-Madison](#)
- [Pepper Pollination Guide](#) by NOVIC and Cornell University
- Seeds of Diversity [Pepper Crop Descriptor Form](#)
- Canadian Organic Vegetable Improvement [Priority Crop Survey Report](#) and [Bell and Corno Pepper Results](#)
- Centers of Germplasm : [Chile Pepper Institute](#), [Centro Agronómico Tropical de Investigación y Enseñanza](#), [Asian Vegetable Research and Development Center](#), [Genetic Information Research Network](#),

⁵ OECD Biosafety Consensus Documents Section 12 - Capsicum Annuum Complex. 303.
https://www.oecd-ilibrary.org/science-and-technology/safety-assessment-of-transgenic-organisms/section-12_9789264095380-15-en;jsessionid=sZGNXZdQTmwzMlw_pXP9J3Dv.ip-10-240-5-29