

Highlighted Articles for September 2023

Wild fruit volatiles reveal how tomato aroma evolved



A fruit's scent is a key part of its attractiveness and flavor and may communicate an honest signal of nutrient content to animal dispersers. However, the volatile organic compounds responsible for fleshy fruit scent have not been well studied in wild species—especially across an entire recently diverged clade. **Barnett et al. analyzed ripe fruit volatiles from 13 species of wild tomato grown under common-garden conditions and assessed evolutionary patterns.** They showed that cladewide differences in nitrogen-containing compounds and esters aligned with the divergence of brightly colored-fruited species from green-fruited species; a divergence that may reflect selection by animal dispersers. They also found evidence that ester compounds may signal the presence of a sugar reward. **These results provide a framework for other studies of fruit scent evolution in crop wild relative systems and have implications for tomato flavor improvement.**

Jacob R. Barnett et al. 2023. Variation in ripe fruit volatiles across the tomato clade: An evolutionary framework for studying fruit scent diversity in a crop wild relative. *American Journal of Botany*
<https://doi.org/10.1002/ajb2.16223>

Fatal encounters: Crop-weed hybrids of *Raphanus sativus* outperform their parents in agricultural and uncultivated environments

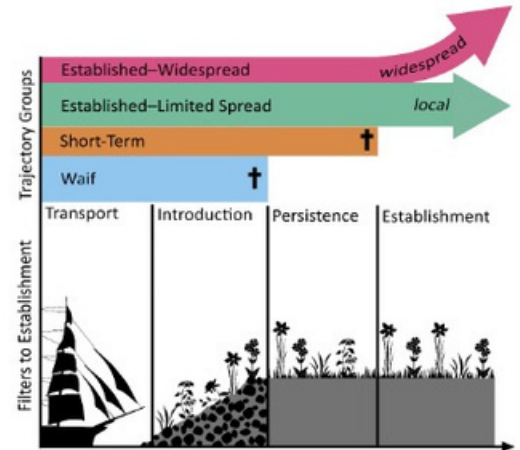
Hybridization between crops and their wild or weedy relatives often leads to hybrids with intermediate or maladapted phenotypes, resulting in poor adaptation and performance. However, genetic mechanisms or maternal effects may favor early-generation hybrids in some environments, potentially leading to increased weediness and invasiveness. **Vercellino et al. explored this phenomenon using cultivated and weedy *Raphanus sativus* (radish) as a model, examining first-generation crop-weed hybrids alongside parents in contrasting ecological conditions (agricultural and uncultivated environments).** Findings reveal that first-generation hybrids exhibited hybrid vigor across measured traits and environments, performing up to 3-fold better than their weed parents. These results were consistent regardless of the direction of hybridization or the year evaluated, further supporting hybrid vigor as the main genetic mechanism. **The study highlights how hybridization between crops and wild or weedy relatives could foster weediness and invasiveness, prompting future research inquiries and potential implications for crop and weed management.**



Román B. Vercellino et al. 2023. The role of intraspecific crop-weed hybridization in the evolution of weediness and invasiveness: Cultivated and weedy radish (*Raphanus sativus*) as a case study. *American Journal of Botany*
<https://doi.org/10.1002/ajb2.16217>

Herbarium specimens provide new insights into the dynamics of historical introductions

The introduction of non-native species has increased with the expansion of global trade and travel networks. Despite the growing body of literature investigating successful biological invasions, few studies have been able to document failed introductions. Schmidt et al. used digitized herbarium records to quantify the establishment and geographic spread of 264 non-native plant species introduced to the northeastern United States (New Jersey) via a single vector—solid ballast deposition associated with 19th century shipping trade. The authors found that 48% of introductions have become established (much higher than traditional estimates of 10%–25%), and, based on their establishment and spread, identified four general trajectory groups. They also discovered that 19th century railroads were important vectors for secondary dispersion from ports. This study documents the floristic impact of historical ballast deposition and highlights the utility of using herbarium specimens to study both successful and unsuccessful historical plant introductions.



Ryan J. Schmidt et al. 2023. Hidden cargo: The impact of historical shipping trade on the recent-past and contemporary non-native flora of northeastern United States. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16224>