

OSU 663, OSU 668, and OSU 677 Pea Breeding Lines Resistant to Pea Seedborne Mosaic Virus

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Resistance to pea seedborne mosaic virus (PSbMV) has become an objective of many commercial and public pea (*Pisum sativum* L.) breeding programs. Cultivar resistance should relieve the pea seed industry of the restrictions and expense involved in avoiding PSbMV contaminated seed. Resistance sources have been identified (Baggett and Hampton, 1972; Stevenson and Hagedorn, 1971) and breeding lines have been released from earlier cycles of the Oregon State Univ. (OSU) breeding program (Baggett and Hampton, 1977; Baggett and Kean, 1988). The OSU breeding program is directed primarily toward resistance to PSbMV pathotype P₁ (PSbMV-P), but advanced lines have also been screened for resistance to PSbMV-lentil strain (PSbMV-L) (Alconero et al., 1986).

OSU 663, OSU 668, and OSU 677 are pea breeding lines that were released in 1990 by the Oregon Agricultural Experiment Station as sources of combined resistance to PSbMV and pea enation mosaic virus (PEMV). These three lines were selected from among available material because they provide combined PSbMV and PEMV resistance in three important types of peas: freezing (shelling) peas (OSU 663), snap peas (OSU 668), and edible pod (Oriental) pea (OSU 677). They were developed as part of a continuing OSU disease-resistant pea breeding program. The stability of the PSbMV-P₁ resistance of these lines was verified using the enzyme-linked immunosorbent assay (ELISA) method.

Origin

OSU 663 is a bulk of several indistinguishable daughter lines of an F₆ line from OSU 547-29 × OSU 695. Resistance to PSbMV-P₁

in OSU 547-29, previously released as a breeding line (Baggett and Kean, 1988), was derived from PI 193586 (Fig. 1). Released as home garden cultivar Oregon Trail (Baggett and Kean, 1992), OSU 695 was the source of improved type and powdery mildew resistance (*Erysiphe polygoni* DC). Both parents are resistant to PEMV.

OSU 668 is an F₆ selection from OSU 584-16 × 'Sugarbon'. In this cross, PSbMV-P₁ and PEMV resistance came from previously released OSU 584-16 (Baggett and Kean, 1988). The original source of PSbMV-P₁ resistance was PI 269774 (Fig. 1). The snap pea trait and powdery mildew resistance came

from 'Sugarbon' (Rogers-NK Seed Co., Boise, Idaho).

OSU 677 is an F₆ selection from OSU 621-20 × M193. OSU 621-20 is a PSbMV-P₁-resistant Oriental pea, and M193 is a PEMV- and powdery-mildew-resistant OSU Oriental pea breeding line derived from 'Oregon Sugarpod II' (Baggett, 1982). The original source of PSbMV-P₁ resistance was PI 193586 (Fig. 1).

Descriptions

OSU 663 is a shelling pea with a short (bush) plant ≈60 to 75 cm in height. It reaches maturity in midseason, with first pods borne on or about node 15. The pods, which are borne two per node, are long, straight, and blunt (Fig. 2A). Typical pods are 9.5 cm long × 1.5 cm wide, bearing up to 10, but typically nine, dark-green (freezer color) seeds. Pods have a moderate ballooning tendency. We judged this pea to have good flavor.

OSU 668 is a snap (thick-walled, edible pod) pea with a bush plant that typically reaches 76 cm in height. It reaches maturity in midseason, with pod set beginning on nodes 15-16. The plant has small leaves and bears a heavy pod crop, mostly two per node. The pods (Fig. 2B) have strings and are distinctly curved. Pods are 7.8 cm long × 1.4 cm wide with average wall thickness for snap peas, and there are usually nine seeds per pod. Pods and seeds are light green (canner color).

OSU 677 is an Oriental pea (flat, edible pod) with a bush plant habit. It reaches maturity

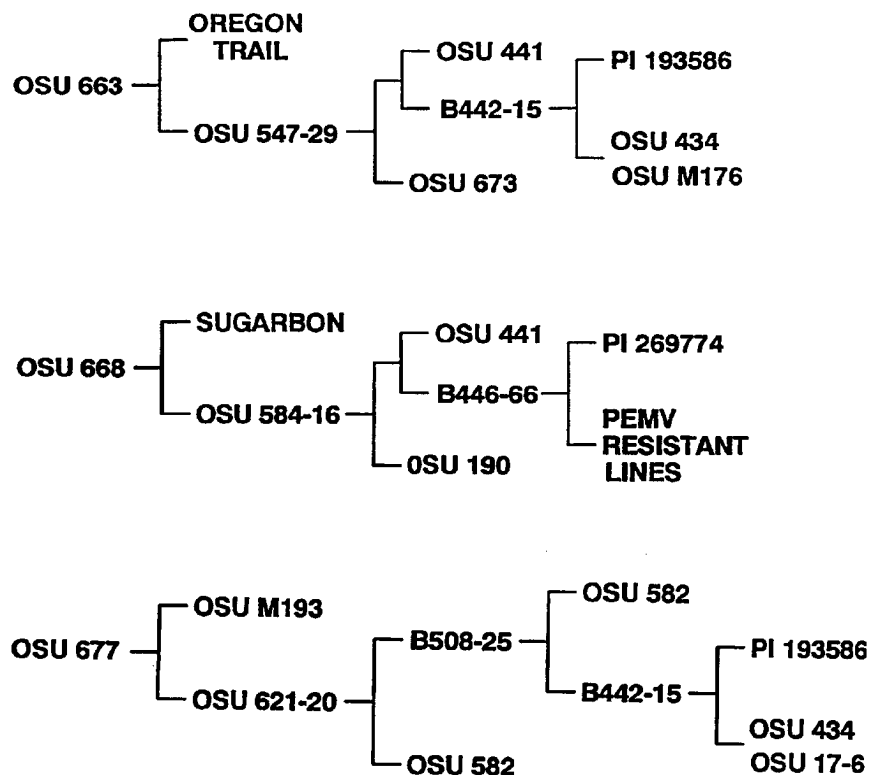


Fig. 1. Pedigrees of OSU 663, OSU 668, and OSU 677 pea lines

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rity in mid- to late season. The plant is typically 76 cm in height, usually bearing two pods per node. Pods (Fig. 2C) are 11 cm long

× 2.3 cm wide and bear eight to nine seeds per pod. Pods and seeds are dark green. Because pods sometimes have slight fiber or parch-

ment, OSU 677 should be used in crosses with high-quality Oriental pea parents.

Disease resistance

All three lines have shown good field resistance to PEMV, powdery mildew, and red clover vein mosaic virus for eight consecutive summers during their development and since their release in 1990. They have also been resistant to common pea wilt [*Fusarium oxysporum* Schlecht. (emend Snyder and Hans.) f. *pisi* (Van Hall) Snyder and Hans. race 1 Snyder.] in field trials conducted at Washington State Univ. from 1989 to 1992.

Resistance to PSbMV-P₁ was determined by mechanical inoculation in greenhouse tests, beginning with screening random F₃ families (selected in the field for PEMV resistance) and continuing with new selections each year. During 1984–92, a total of 676 plants of OSU 663, 344 plants of OSU 668, and 216 plants of OSU 677 were inoculated with the type strain of PSbMV-P₁ in the greenhouse. Plants suspected of being infected with PSbMV-P₁ were determined to be free of detectable infection by back inoculation to 'Sounder' or by ELISA. One infected OSU 677 plant from 1993 inoculations was confirmed positive by ELISA and assumed to be a genetic variant or seed mixture. Susceptible controls mechanically inoculated during 1984–93 were infected at 60% for 'Sounder' and 86% for 'Little Marvel'.

In 1990 and 1991, a total of 231 plants of OSU 663, 70 plants of OSU 668, and 70 plants of OSU 677 were noninfected after inoculation with PSbMV-L [pathotype P₁ (Alconero et al., 1986)].

Availability

Samples of seed for breeding purposes can be obtained from J.R.B.

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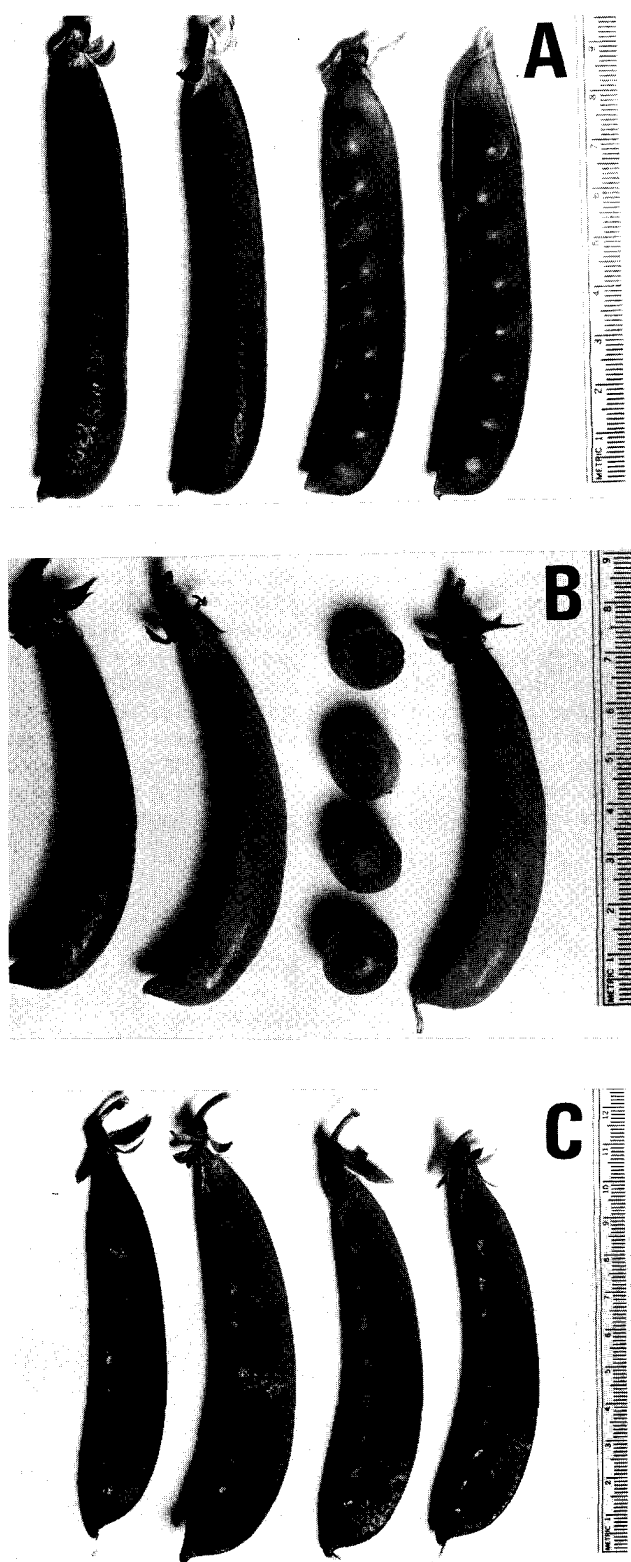


Fig. 2. Pods of (A) OSU 663, (B) OSU 668, and (C) OSU 677 peas at acceptable stages for harvest.