Journal American Pomological Society 55(3):189-191 2001

'Challenger' and 'Intrepid' Peaches

D. J. WERNER, S.M. WORTHINGTON, AND L. K. SNELLING[1]

Abstract

'Challenger' and 'Intrepid' are high chilling (950-1000 chill units), late flowering yellow flesh peaches [*Prunus persica* (L.) Batsch] that demonstrate high flower bud cold hardiness during dormancy and bloom. they are expected to be adapted to areas where 'Contender' has been grown successfully. both cultivars have small, reniform leaf glands, and non-showy flowers and produce medium-sized, attractive fruit that show attractive red color over a bright yellow ground color. Fruit ripen in late June to early July in south central North Carolina, about 18 and 11 days before 'Contender' for 'Challenger' and 'Intrepid', respectively. Fruit flesh is melting and freestone.

'Challenger' and 'Intrepid' peaches were released in 1999 by the North Carolina Agricultural Research Service. 'Challenger' and 'Intrepid' were selected at the Sandhills Research Station, Jackson Springs, NC in 1991 by D. J. Werner and S. M. Worthington. they originated from the 1987 cross of 'Redhaven' x (NCA001, NCA002, and NCA003 pollen bulk). NCA001, NCA 002, and NCA003 all originated from the 1981 cross of 'Reliance' x 'Briscoe'. 'Reliance', developed at the University of New Hampshire, is a soft, poor quality cultivar that possesses excellent flower bud cold hardiness, allowing it to be cultured in areas typically too cold for peach culture (1). Seedling progeny from this cross were grown out and evaluated at Jackson Springs, NC. After initial seedling selection, both cultivars were asexually propagated on 'Lovell' rootstock and put in an advanced selection trial at Jackson Springs, NC.

'Challenger' and 'Intrepid' ripen about July 1 and July 8, respectively in south central North Carolina (Table 1), about 18 and 11 days before 'Contender'. Both cultivars bloom before 'Contender' but after 'Redhaven' in most years; the chilling requirement to satisfy flower bud endodormancy is about 950-1000 hours below 4°C for both cultivars. Flower buds of 'challenger' and 'Intrepid' possess high levels of resistance to cold temperature. Resistance to cold temperature was confirmed in Spring 1996; trees of both cultivars still had live flower buds even after exposure to 6 consecutive subfreezing nights at about 50% bloom (Table 2). Flower buds of all commercial check cultivars in the same test block, except 'China Pearl', had no live flower buds. Trees of both cultivars subsequently set a fruit crop that year. No fruit was produced on any other commercial cultivar except for 'China Pearl'.

Fruit of 'challenger' and 'Intrepid' are medium size (Table 1), typically averaging 2.5 (6.4 cm) and 2.6 (6.6 cm) per fruit, respectively. Because of their moderate to high flower bud density (# flower buds/node), heavy thinning will be required in years of little natural fruit thinning from freeze events. Fruit of both cultivars have shown acceptable performance for fruit suture, fruit pubescence, fruit skin color (Royal Horticulture Society Colour Chart (RHS) 45Q and 18A for overcolor and ground color, respectively for both cultivars), fruit flesh color (RHA 21B for both cultivars), and fruit firmness (Table 1). Although commercially acceptable, fruit firmness of 'Challenger' and 'Intrepid' is inferior to many commercial peach cultivars, hence local marketing of fruit is suggested. Fruit are round and have shown little tendency to produce a tip over the

[1]Department of Horticultural Science, North Carolina State University, Box 7609, Raleigh, NC 27695-7609. This research was funded in part by the North Carolina Agricultural Research Service and North Carolina Foundation Seed Producers, Inc. The technical assistance of the staff of Sandhills Research Station, Jackson Springs, NC, is gratefully acknowledged.

Table 1. Average ripening date and fruit characteristics of 'Challenger' and 'Intrepid' peach and other commercial cultivars at Jackson Springs, NC (1994-1997).

Cultivar	Ripe date[Z]	Fruit diameter (cm)	Fruit suture[Y]	Fruit pubescence[Y]	External (%)	Flesh color[Y]	Fruit firmness[Y]
Challenger	182	6.4	4.0	4.3	79	3.8	3.5
Intrepid	188	6.6	3.8	4.0	58	3.8	3.5
Biscoe	207	6.6	3.0	3.3	57	4.3	3.6
Contender	199	6.9	3.7	4.7	73	4.3	4.3

[Z]Julian date.
[Y]Ratings based ona scale of 1-5: 1 = poor, 3 = good, 5 = excellent.

four years of evaluation. However, it is expected that fruit shape would suffer in more southerly growing areas of the U. S. 'Challenger' and 'Intrepid' fruit are yellow-fleshed and show little red flesh pigmentation. The flesh is very resistant to oxidative browning on bruised or cut surfaces. Flavor and texture are excellent.

Foliage of 'Intrepid' and 'Challenger' are moderately resistant to bacterial spot disease incited by *Xanthomonas campestris* pv *pruni* (Table 3). Fruit have shown no evidence of infection in years of heavy disease pressure. Trees of 'Challenger' and 'Intrepid' show a growth rate and tree habit typical of most commercial cultivars. Flowers are red-purple (RHS 63C and 58C for 'Challenger' and 'Intrepid', respectively) and non-showy. Pollen is abundant. Leaf glands are small and reniform.

'Challenger' and 'Intrepid' will provide growers with consistent cropping, midseason cultivars. their high flower bud density, and cold hardiness that exceeds that of most currently grown commercial cultivars should make them an appropriate choice for peach growers in many production areas, particularly in areas where peach culture is tenuous due to the prevalence of cold injury to flower buds. these cultivars will also be valuable for commercial production in other peach growing regions of the U. S. that receive sufficiently cool winter temperatures to satisfy their high chilling requirement.

Table 2. Flower bud cold hardiness rating of 'Challenger' and 'Intrepid' and other peach cultivars after exposure during dormancy to -16°C on 2-9-96, and exposure at about 50% bloom to minimum temperatures of -3.3°C, -9.4°C, -7.7°C, -5°C, --3.3°C, and -1.6°C on consecutive nights between March 9 and March 14, 1996, respectively.

Cultivar	Flower bud hardiness rating[Z]
China Pearl	3
Challenger	1
Intrepid	2
Biscoe	0
Contender	0
Encore	0
Legend	0

[Z]Rated on a scale of 1-5 with 1 = sufficient live buds for 20% crop, 2 = sufficient live buds fpr 20-40% crop, 3 = sufficient live buds for 40-6-% crop, 4 = sufficient live buds for 60-80% crop, and 5 = sufficient live buds for full (100%) crop. Data taken March 20, 1996 at Jackson Springs, NC.

Table 3. Mean bacterial spot (*Xanthomonas campestris* pv. *pruni*) reistance as measured by percent defoliation for 'Challenger' and 'Intrepid' and other peach cultivars for years 1995-1997 at Jackson Springs, NC.

Selection	% defoliation
Challenger	18.3
Intrepid	15.0
China Pearl	28.3
Biscoe	15.0
Contender	13.3
Encore	43.3
O'Henery	70.0
Legend	26.6

[Z]Data shown represents % leaf defoliation. Data taken August 15 - August 30.

Both of these cultivars were derived in part from germplasm outside of the 'Chinese Cling' genetic base. The majority of eastern U. S. commercial peach cultivars trace back exclusively to 'Chinese Cling' (2). 'Reliance', in the pedigree of both 'Challenger' and 'Intrepid' is not descended from 'Chinese Cling'. Thus, these cultivars will serve to broaden the genetic base of commercial peach production in the U. S., and will serve as an important source of germplasm for breeders elsewhere.

A plant patent has been filed for both 'Challenger' and 'Intrepid', and a propagation agreement is available through the North Carolina Agricultural Research Service, P. O. Box 7601, Raleigh, NC 27695. Budwood is indexed free of Prunus plum pox virus.

Literature Cited

1. Meader, E. M. 1964. 'Reliance', a new, hardy freestone peach. Fruit Var. and Hort Digest. 18:68.
2. Scorza, R. S. A. Mehlenbachere and G. W. Lightner. 1985. Inbreeding and coancestry of freestone peach cultivars of the eastern United States and implications for peach germplasm improvement. J. Amer. Hort. Sci. 108:747-750.

Nitrogen Timing - Grape Fruit Set

Low N during the preceding season reduced berry set without any effect on number of flowers/cluster or seeds per berry. A high N supply during spring growth decreased flowers/cluster, increased fruit set and seeds/berry and had no effect on berries/cluster. Berries per cluster is more affected by the previous year's N supply that the current year. From Duchene et al 2001 Vitis 40(1):45-46.

Low Temperature - 'Autumn Bliss' Growth

Plants which receive little chilling grew slowly and failed to develop beyond short rosettes of leaves, but as chilling increased, the rate of vegetative growth increased. This coincided with a decline in time of flowering. When vernalization of actively growing canes was tested, flowering was advanced, indicating a distinct vernalizing effect. From Carew et al 2001 J. Hort.Sci & Biotech. 76(3):264-270.

Pollen Dispersal - High Density Apples

Seeds sired by the pollenizer cultivar were found from 7 ('Granny Smith') to 18 rows ('Idared') from the nearest pollenizer tree and from 7 ('Fuji', 'Paulared') to 5 trees ('Granny Smith') down the same row. The maximum pollen dispersal distance was greater across rows (62.4 m) than along rows (13.7m). However, the average dispersal distance across rows, expressed in distance or trees (17.4 m $\pm$ 3.6, 3.6 $\pm$ 0.7 trees) did not differ from that along rows (5.8m $\pm$ 4.1, 2.7 $\pm$ 0.8 trees). "These results are at odds with previous studies that indicate that honeybees move farther along rows than across, and have important implications for the design of commercial apple orchards." From Kron et al 2001 J. Hort.Sci. & Biotech 76(3):286-294.