plant with resistance to diseases, and for erect, and preferably, thornless canes. At present, two thornless selections and several thorny ones are in advanced stages of testing and appear very promising.

Introduction and Evaluation of Low Chilling Peach and Nectarine Cultivars in the Bolivian Highlands[1]

RALPH SCORZA AND HUMBERTO MIRAMENDY[2]

ABSTRACT

Low chilling peach and nectarine cultivars introduced from the University of Florida, Gainesville, Fruit Crops Department breeding program undergo normal vegetative and reproductive growth cycles in Bolivia at 1848 m altitude, latitude 16° 25′ S. Measurements of fruit weight and external color indicate that this area can produce fruit of quality comparable to the same cultivars grown in Florida.

Peach and nectarine cultivation in Bolivia is limited to the highland areas 1800 to 3000 meters in elevation between latitudes 15° 44′ and 21° 32′ S. Production is low. Most trees are white fleshed seedlings of poor quality or imported cultivars such as Cardinal, Dixired, Redhaven, and Elberta, which do not receive adequate chilling for proper growth or fruit production (1, 2, 3).

MATERIALS AND METHODS

In 1976, through agreements between the Bolivian Institute of Agriculture (IBTA) and the University of Florida, Gainesville, budwood of low-chilling peach and nectarine cultivars and advanced selections from the University of Florida Department of Fruit Crops breeding program was sent to the IBTA Irupana nursery for testing. Irupana is located at latitude, 16° 25′ S, 1848 meters in altitude on the eastern slope of the Cordillera Real range of the Andes. Weather data for 1959-1979 obtained from the Bolivian National Hydrological and Meteorological Service show that the lowest monthly mean temperature is 16°C in July (Fig. 1). This temperature correlates closely with 270 chill hours (4). Budwood of 8 advanced peach and nectarine selections (one, TA 170 has subsequently been released as Earligrande peach) and 4 named cultivars was received by the Irupana nursery in November of 1976 and budded on seedling rootstocks. The cold requirement of the introduced varieties ranged from approximately 100 to 350 chill hours (Table 1).

Trees were planted in the field at the Irupana nursery in December 1976. An 18-46-0 fertilizer was applied to each tree in August of 1977, 1978, and 1979 at 300 grams per tree. Pruning was minimal. Thirty trees were in production in 1979. Individual trees were harvested as fruit ripened, each

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fruit weighed, measured with calipers and qualitatively rated for external red color and blemishes.

RESULTS

In the Irupana area July is not only the coldest month of the year, it is also the driest with a 10-year average precipitation of 30 mm (Fig. 1). July is associated with leaf drop of all deciduous trees in the area including peaches and nectarines. This dry period and leaf loss induce the bud dormancy necessary for proper tree growth and fruit production. Peaches and nectarines flower in the Irupana area during the months of August and September and are harvested between October and December (Fig. 1). While relatively few fruits were produced in 1979 due to the young age of the trees, excellent vegetative growth (Fig. 2) and quality of the fruits is noteworthy.

Fruit weight ranged from an average of 65.0 g (Flordabelle) to 130.0 g (Flordabeauty) and color from about 25% red blush on the fruit surface (Fla. 3-4 and Flordared) to 100% red color (Flordagold and Flordabeauty). Weight and color compare favorably with the performance of these cultivars and selections in Florida (Table 1). As tree size increases yield data will become meaningful.

It should be noted in Figure 1 that peaches and nectarines ripen in the Irupana area during the season of highest Mediterranean fruit fly (*Ceratitis capitata* Weidemann) poulation. This pest did not damage fruit harvested in 1979 but it must be considered a potential threat to fruit production in the area. A slight amount of fruit blemishing was observed and some losses occurred due to wasps and bees consuming ripe fruit. As commercially grown fruit are picked early for shipping these losses would be minimal.

CONCLUSIONS

It is evident that the Irupana area can produce fruit of excellent quality

Table 1. Characteristics and performance of peach and nectarine cultivars and selections in Florida and Irupana, Bolivia.[1]

Cultivar or Selection	Fruit type	Chill requirement (hours)	Days to ripen from flowering	External color[2]		Weight (g)		Size (long × trans) (cm)
		Florida	Florida	Florida	Irupana	Florida	Irupana	Irupana
Flordagold	peach	325	90	2.5	4.0	85	125	7.3 × 7.0
Flordabeauty (Flordales)	peach	150	110	2.2	4.0	100	130	7.6 × 6.4
Flordared	peach	100	90	2.8	1.6	80	70	6.0 × 5.1
Flordabelle	peach	150	115	2.8	1.8	100	65	6.0 × 5.2
Earligrande (TA 170)	peach	200	70	2.5	3.2	60	75	6.1 × 5.9
5-19	peach	300	109	3.1	2.4	100	70	6.1 × 5.2
2-4	peach	250	100	3.1	2.2	90	70	6.1 × 5.0
5-2	peach	150	85	3.7	2.9	85	65	5.7 × 5.3
5-8	nectarine	200	80	3.4	3.3	70	70	5.9 × 5.7
3-4	nectarine	300	90	3.7	1.6	80	70	6.1 × 5.0
5-13	nectarine	250	90	4.0	2.6	80	65	5.7 × 4.9

[1]Data for fruit performance in Florida is based upon published cultivar descriptions and personal communication from W. B. Sherman, Fruit Crops Dept., University of Florida.
[2]1 = 100% yellow, 2 = 33% red blush, 3 = 66% red blush, 4 = 100% red.

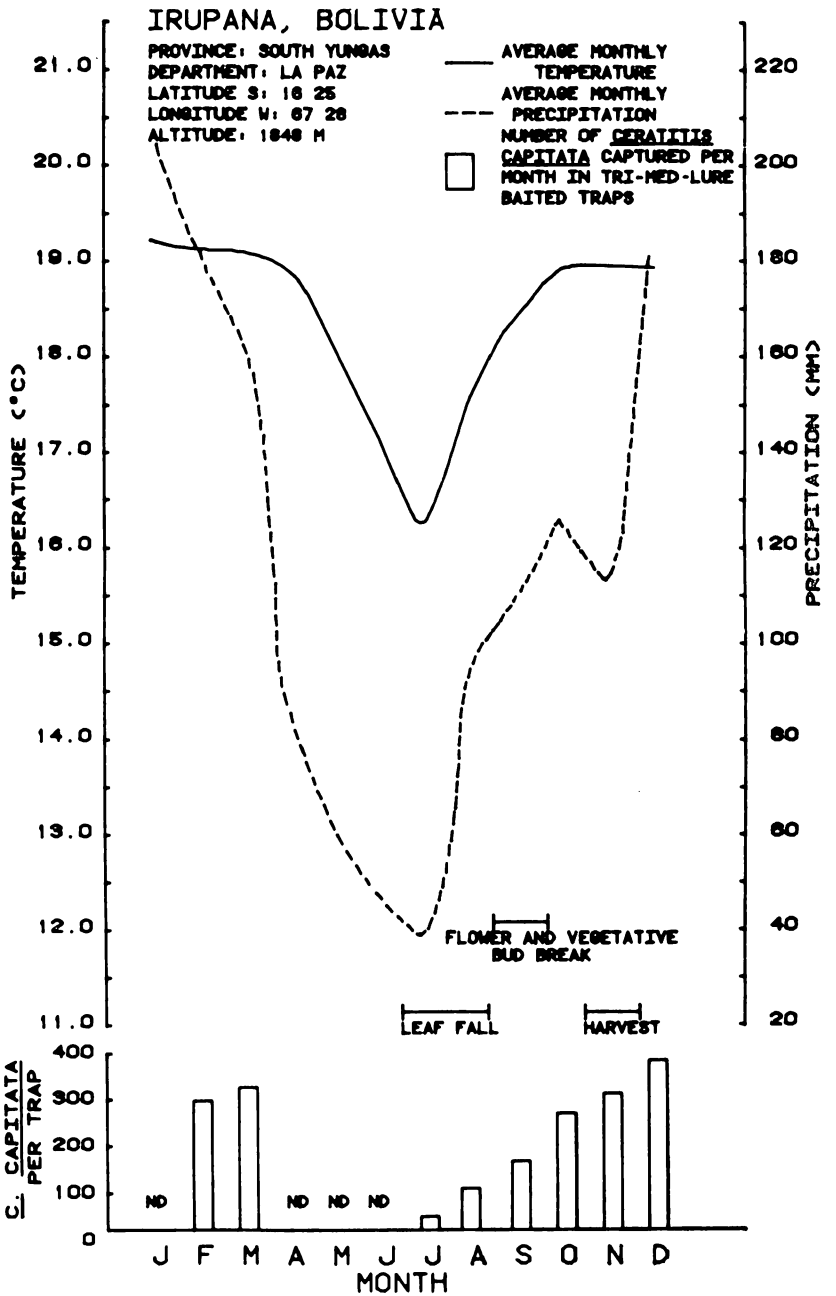

Fig. 1. Temperature, precipitation, and Mediterranean fruit fly *(Ceratitis capitata)* population in relation to leaf fall, bud break and harvest of peaches and nectarines in the vicinity of Irupana, Bolivia.

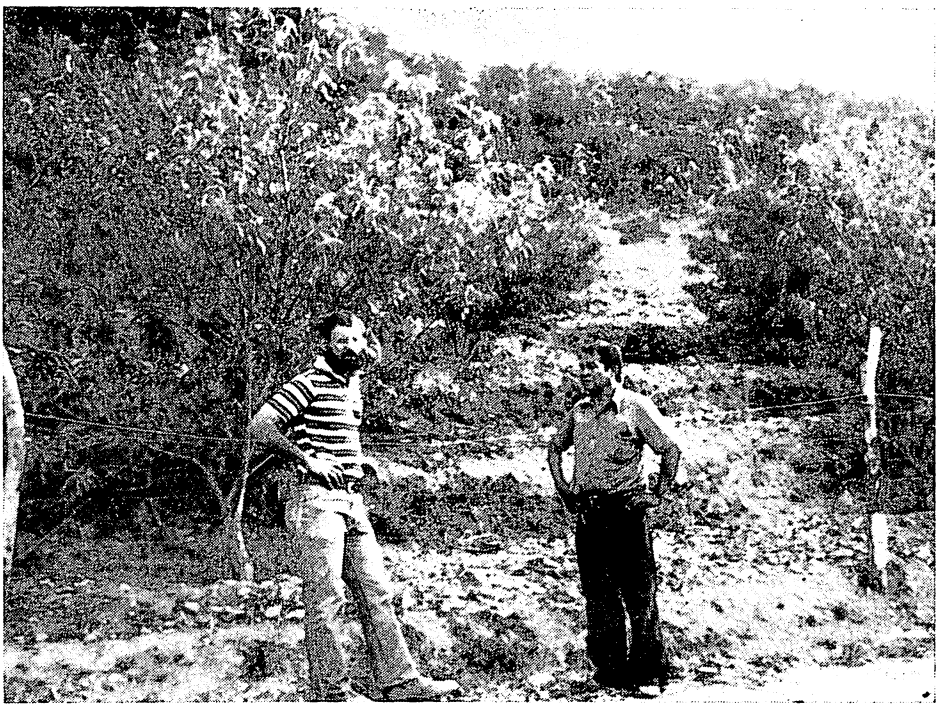

Fig. 2. Three-year growth of budded low-chilling peaches introduced from Florida at the Irupana nursery, Bolivia.

based upon evaluation of peaches and nectarines introduced from Florida. Investigations at this time are preliminary and it is not known how well these cultivars will yield. Continued cultivar evaluation and testing in Irupana and other locations along the eastern slopes of the Cordillera Real could lead to the development of an expanded Bolivian peach industry.

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