

DRIED PLUM CULTIVAR DEVELOPMENT AND EVALUATION

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INTRODUCTION

California is the world leader in dried plum production, but is almost entirely dependent on the use of a single cultivar, the Improved French prune. The utilization of this older cultivar and several other mutations from the French type represents the vast majority of the total dried plum acreage in California. This monoclinal situation with its genetic similarities lends itself to vulnerability of widespread disease, pest outbreaks and state wide yield decline due to the effects of weather that can negatively effect fruit set and/or fruit retention. In addition to the risks of a monoculture system, the entire industry harvests and dehydrates the crop within a few weeks since the one cultivar matures at the same time. The development of new acceptable, or superior, dried plum cultivars will increase the efficiency of California dried plum production and give some protection against the risks involved with a monoculture. The industry will also benefit from the development of new dried plum varieties that have cost saving characteristics such as tree structure, processing qualities, and tolerance to pest and disease. Introducing new dried plums that differ in flavor or color could promote a broadening of the consumer base.

The Dried Plum (*P. domestica*) Development and Evaluation program has enlarged its germplasm and bred new generations of progeny through traditional horticultural breeding methods since its conception in 1985. Through over twenty years of evaluation and selection, the breeding program has increased the variability of desired characteristics in the germplasm. To insure that the germplasm and new cultivars are well adapted to California's dry, hot climate, the program evaluates elite selections at two locations; the UC Wolfskill Experimental Orchards, near Winters, in the north; and the Kearney Ag Center, near Parlier, in the southern San Joaquin Valley. The breeding program is now in a very productive period for producing potential new cultivars that are specifically adapted for California growing conditions and markets. Two new dried plum cultivars (Sutter and Muir Beauty) have been released and planted, and are being commercially evaluated by the industry for their potential use in California..

We have recently discovered and are evaluating new dried plum selections that include a wide variety of flavors and dried fruit characteristics that are superior to the commonly produced Improved French cultivar. We believe these new dried plums have the potential of revitalizing consumer interest for California dried plum products. Conversely, we acknowledge that many of these new characteristics are not necessarily conducive to traditional processing methods. The program intends on introducing some of these unique dried plums to the industry while aggressively pursuing new selections that are easily processed and mix well with Improved French.

In the last three out of six years dried plum orchard yields have been down because of poor weather conditions for fruit set during the bloom period. We believe that this has been largely due to high temperatures during fruit set. Since the California industry is composed of 1 cultivar, the whole statewide industry suffered with poor crops during those years of heat during bloom.

Because the critical time of pollination is so important we have begun to evaluate our seedlings and selections for differences in bloom date. In doing so, new cultivars can potentially introduce greater diversity of bloom timing so that the entire Californian crop will not be dependent on the same set of weather conditions during periods critical for fruit set and retention.

PROGRAM OBJECTIVES

- 1.) To develop new dried plum varieties, through traditional horticultural breeding methods, with the following characteristics:
 - A) Increased fruit quality and improved fruit characteristics that increase efficiency and quality of drying and processing.
 - B) Earlier/later bloom and fruit maturity dates than “Improved French” dried plum
 - C) Tree characteristics that reduce labor cost involved in producing dried plums.
 - D) New specialty traits; with the dried product being equal or improved in quality to “Improved French”, but differing in taste or color.
 - E) Tolerance/resistance to disease.
- 2.) Test and evaluate advanced selections resulting from the current breeding program at UC and grower locations in the Sacramento and San Joaquin Valleys.

PROCEDURES

Breeding methods, pollination and seedling cultivation, and selection evaluation have not been modified this year. They are described in detail in the Dried Plum Cultivar Development and Evaluation annual report in the 2004 Prune Research Reports published by the California Dried Plum Board.

Levels of Testing

Field testing and evaluation of dried plum selections developed within this program are being carried out at four levels. This testing procedure was not modified since 2006 but is reported as a reference for the result section of the report.

Level 1 testing involves evaluations made in the seedling blocks located at UC Davis. The initial fruit evaluation is made on the original self-rooted seedlings in the high density seedling blocks. Fresh and dried fruit characteristics are evaluated at this level of testing. If a positive evaluation results, the seedling becomes a “selection” and is then considered for re-propagation in dried plum selection blocks located at Kearney and at the Wolfskill Experimental Orchard in Winters, CA.

Level 2 testing occurs in the selection blocks at Kearney and Wolfskill. Depending on the perceived potential of the individual selection, two to four trees of any one selection are established on commercial rootstocks. This level of testing is concerned with fruit characteristics and whole tree characteristics. Variations in fruit size, tree vigor, maturity date and other characteristics may, and often do, occur when the selection is moved onto a rootstock from the

original seedling. Individual selections are evaluated in the selection blocks prior to advanced testing with growers.

Level 3 testing involves the establishment of advanced selections in grower orchards in various locations. Testing at this level is still somewhat preliminary since these plantings are the first instance in which selections are established in varying soil types and in varying climatic regions. Again, depending on the perceived value of the individual item, two to fifty trees of any one selection are established at any one location. Level 3 grower tests are established in counties throughout the Sacramento and San Joaquin Valleys where dried plums are a commercial crop.

Level 4 testing involves the planting of small test acreage, usually of a single targeted selection. The size of these Level 4 plantings depend on the apparent potential of the individual selection and the level of risk that the cooperating grower wishes to assume. Planting size ranges from twenty- five to several hundred trees. At this level, thorough tests on process-ability and acceptability in the commercial market is conducted. This will then determine the commercial value of the item.

Dried Plum/Prune Testing Group

The Plum/Prune Testing Group incorporates the participation of growers and processors to evaluate and test dried plum selections for their potential as new cultivars before patenting and public release.

For the past twenty years the University of California has been conducting the dried plum/prune breeding and evaluation program that has been jointly supported by the Department of Plant Sciences (previously the Department of Pomology) and the California Dried Plum Board. This program was originally initiated at the request of the California Dried Plum Board with the primary goal of developing cultivars that would extend the harvest season with quality characteristics that equal or exceed those of the California standard, Improved French. This project has made substantial progress toward that goal with the release of Sutter and Muir Beauty, which have the potential to be harvested up to two weeks earlier than Improved French.

The process used in the final evaluation and release of these two cultivars was based on a traditional model that public breeding programs have used for the past 50 years. After identifying selections that appeared promising and evaluating those selections at the University and in limited grower trials, the selections deemed suitable for public use were patented and released, assuming that there would be enough interest from growers, packers and nurseries to promote the cultivars and allow them to receive the true test of time in the commercial marketplace. While this model is still valid in a general sense and will ultimately sort out the value of Sutter and Muir Beauty to the California industry, it is now apparent that it may not be the most efficient or effective model for the evaluation and release of dried plum cultivars in the future.

International patent law basically forces the University (or any plant breeder) to start the process of making the cultivars it releases available to the rest of the world within 5 years after release in the United States. Under the current system it may take up to ten years for the California industry to decide whether a newly released cultivar warrants widespread planting and so by the time that decision is made in California, the cultivars would also be made available in other countries. Thus it is apparent that continuing to use the traditional model to release cultivars will not allow

California growers to take full advantage of the new cultivars that are developed in the dried plum breeding program. In addition, one could argue that there are considerable opportunity costs for the California industry to continue to plant old cultivars if improved cultivars are available but not accepted into the marketplace in a timely manner.

Therefore we have developed a new strategy for the final evaluation and future release of dried plum/prune cultivars derived from the breeding program. In 2005 we organized a Dried Plum/Prune Testing Group that will help develop a better strategy for the release of new cultivars and participate in carrying out that strategy.

The group has met two times a year since 2005 to develop testing strategies and evaluate advanced plum/prune selections. Participation in the group involves two general meetings a year, one in the summer just before prune harvest to look at fresh fruit and tree characteristics and a second time in the fall, for the evaluation and discussion of dried product characteristics. The objective is to benefit from greater grower and processor input on individual selections as well as increase grower test plot participation so that by the time a selection is identified for release, the industry is well informed about the cultivar and comfortable about committing to plant, process and sell the cultivar commercially.

The advantage of this strategy will be that at the time a cultivar is released, the California industry will be in a position to take advantage of a 10+ year window of opportunity before other countries could effectively grow the cultivar (five of those years would come from a delay in registering a patent in foreign countries and an additional 5+ years would come from the time it would take for any foreign country to import, propagate and field test the cultivar under their conditions).

The advantage for participation in this testing group will be that growers and processors will gain first-hand information on all new selections in the program on which to base future planting/marketing strategies, participate in test plantings as well as have early access to new cultivars slated for release, and help direct the breeding and evaluation program to address germplasm-based issues in the future.

However, based on the discussions that have taken place in the testing group, it is now clear that in order for the California Dried Plum industry to take full advantage of the breeding program more emphasis must be placed in getting significant commercial field testing in place earlier in the evaluation process of advanced selections. Currently, even after growers show substantial interest in planting a new selection, they are hesitant because of uncertainty about their acceptability by processors. Similarly, processors are hesitant to commit to accepting the fruit from new cultivars until they have test processed significant amounts of fruit. Based on this "Catch 22" situation we believe that we need to increase efforts to "spread the risk" of developing test plantings of new selections to enable earlier decisions by processors regarding the advisability of planting new selections. We believe that it is in the best interest of the growers and processors to have clear communication regarding the acceptability of new cultivars. This will allow the industry as a whole to take full advantage of new cultivars while avoiding plantings of unwanted items. In the next couple of years we will continue to work

toward enhancing our advanced testing protocols to accomplish quicker establishment of larger (2-10 acre) test plantings to accomplish this goal.

RESULTS

Bloom Data

The importance of bloom data has grown in the last 6 years because of the changing weather patterns that California has experienced. It has become more common to have heat spells in March that often have temperatures near 80°F. If high temperatures occur when French is blooming the biological mechanisms for successful pollination and fertilization are negatively affected. The result has been low fruit set across the state. Variation for time of bloom is naturally found within the breeding programs germplasm. Introducing new cultivars to the California dried plum industry that have bloom times earlier or later than Improved French could reduce the risk of having the entire crop reliant on good weather conditions occurring during French bloom. This year bloom was successful for most prune growing areas.

Bloom data, including date of full bloom (90% flowers open), amount of bloom, and the first and final day of bloom has been recorded for all the Level 2-4 selections since 2003. Table 1 shows the average number of days each top selection blooms before or after Improved French's full bloom. Because bloom time varies from year to year depending on annual chilling accumulation and spring time temperatures the table also shows the range of number of days over the years each top selection blooms before or after Improved French's full bloom.

Table 1. Bloom data for the 2009 top selections.

Selection	Days in Bloom in 2009	Avg. # of days different than French full bloom date	Range for number of days different than French full bloom date
Muir Beauty	14	-7.3	-17 to -3
Tulare Giant	11	-5.3	-13 to -2
Sutter	9	-0.5	-4 to 2
French	9	0.2*	-2 to 3 *
E7S-37	10	-7.5	-11 to -4
F11N-27	14	-6	-3 to -8
F13S-46	9	-4	0 to -4
F2N-32	9	-3	-2 to -3
F9N-21	7	-6	-4 to -7
E6S-12	9	-3	-1 to -4

* within orchard variation

Level 4 Testing

Level 4 testing evaluates the commercial value of advanced selections and looks at the potential markets for the item. The program is evaluating three items at this level. The first is Muir Beauty (UCD # D6N-72), the cultivar that was released as a pollenizer for Tulare Giant in January 2004. The second is the dried plum cultivar, released in 2000 Sutter. The third is Tulare Giant, a fresh market cultivar released in 2000.

Muir Beauty

Muir Beauty dried plum set a good crop on the mature trees at Kearney and Wolfskill. The harvest date for Muir Beauty was about 10 days before French at the two UC locations (Table 2). Full bloom of Muir Beauty occurred in early to mid March overlapping with the beginning bloom of French and Sutter. Muir Beauty bloomed a day earlier than Tulare Giant this year with their overlap extending over five days.

Commercial drying, pitting and handling tests of Muir Beauty indicated that the fruit will be difficult to process using the standard practices used for Improved French. It is suspected to need more drying time than French. More research is needed to determine if rehydration cook times or sorbate applications can be adjusted to compensate for the larger fruit size and less fibrous flesh texture of this cultivar. Until those issues are resolved, the recommended use for this dried plum is as a whole natural product.

Table 2. Muir Beauty 2009 harvest dates and fresh fruit data compared to French harvest data.

Location	Selection	Harvest Date	Internal Pressure (PSI)	Soluble Solids (Brix)	Fruit Size (ct/lb)	Crop Size
Kearney Ag. Orchard	Muir Beauty	12-Aug	3.3	23.2	34	Medium
	French	25-Aug	3.06	22.4	57	Medium
Winters Research Orchard	Muir Beauty	10-Aug	3	22	38	Medium
	French	31-Aug	3.4	26.3	48	Medium

Sutter

Sutter's bloom overlapped with French but was extended prior to and past French bloom by about a day. Sutter harvest was about 10-20 days before Improved French. At all locations Sutter had comparable sugars to French (Table 3). The Sutter variety provides the dried plum industry a cultivar with an early harvest date and high soluble solids.

In 2008 a study was conducted in order to identify the optimal harvest time of Sutter. This research indicated that Sutter should be harvested when fruit flesh pressures are between 5-6 PSI rather than waiting until pressures are at 3-4 PSI. When this recommendation was followed commercial drying, pitting and handling of Sutter had excellent results.

Table 3. Sutter 2009 harvest dates and fresh fruit data compared to French harvest data.

Location	Selection	Harvest Date	Internal Pressure (PSI)	Soluble Solids (Brix)	Fruit Size (ct/lb)	Crop Size
Kearney Ag. Center	Sutter	18-Aug	5.27	25.4	52	Medium
	French	25-Aug	3.06	22.4	57	Medium
Winters Research Orchards	Sutter	17-Aug	6.3	26.1	45	Medium
	French	31-Aug	3.4	26.3	48	Medium

Tulare Giant

The results of the 2003 pollen self-compatibility experiment showed that Tulare Giant is only partially self-fertile. Without a pollinizer the cultivar did set a minimal amount of fruit but the reduced set could not be considered an economically profitable crop. Thus, Tulare Giant requires another *Prunus domestica* cultivar as a pollinizer to set an economic crop. Muir Beauty is the recommended pollinizer for Tulare Giant. Muir Beauty's bloom time overlaps Tulare Giant's bloom time quite well and with a large quantity of flowers it makes a very good pollinizer. A pollen compatibility test was done in 2004 proved that Muir Beauty used as a pollinizer sets a very heavy crop on Tulare Giant. Hand thinning is recommended to reduce the final crop size to a commercial level. Studies have not been done to determine the best planting ratio of pollinizer to main variety but our best guess is every third tree in every third row.

Tulare Giant and Muir Beauty bloom overlapped quite well this year with Muir Beauty overlapping the first 5 days of Tulare Giant bloom and French overlapping the final two days of bloom. The harvest was normal with the fruit at Kearney Ag Center maturing on July 10 (7.2 PSI) and on July 9 (6.6 PSI) at Wolfskill. The soluble solids ranged between 16.3-17.2 ° Brix.

Level 3 Testing

Level 3 testing is the evaluation of selections that are being grown and tested in grower's orchards. The top selections that are now at Level 3 testing are D6N-103, G1S-83, F9N-21, F13S-46, and F11N-27. A few items such as D18S-12, D18S-7, D2N-76, D10S-8 and D18S-50 have been removed from level 3 this year. These selections have been tested by growers with little interest from processors; they will still be monitored for use in niche markets but have been deemed unusable for the main commercial market. Harvest data for the rest of the level 3 selections are shown in Table 4.

G1S-83 is a large sweet prune that might do well in a specialty fresh market. It has an appealing shape similar to French, but is not recommended for drying. It has a red blush color and will stay firm on the tree for a few weeks. In late July, it had a Brix of over 20 with approximately 7 lbs pressure at both our Winters and Kearney orchards. This is its second year of production in our selection blocks and has produced great tasting, large fruit. Some characteristics that need further evaluation are fruit color and frequency of split pits.

Table 4. Level 3 selection performance for 2009 at university selection blocks. The location designation after harvest date indicates W (Wolfskill), K (Kearney). 'Days from French' refer to the difference between French harvest date and the harvest date of the selection at the same location. Harvest date listed is specific for locations where samples were collected.

Selection	Harvest Date	Days from French	Pressure (PSI)	Soluble Solids (Brix)	Fruit Size (ct/lb)	Crop Size
G1S- 83	7/27 (W)	-33	7.7	23	Fresh only	Light
G1S- 83	7/31 (K)	-25	7.1	21.7	Fresh only	Light
F11N-27	8/17 (W)	-13	2	40	--	Very light
F11N-27	8/12 (K)	-13	4.1	33	40	Medium
F13S- 46	8/3 (W)	-27	6.1	23.4	39	Medium
D6N-103	7/31 (K)	-25	5.1	19.6	Fresh only	Light
D6N-103	8/3 (W)	-27	9.6	19.7	Fresh only	Light
F9N-21	7/31 (K)	-24	4.9	27.7	45	Medium
F9N-21	7/27 (W)	-26	5.7	29	44	Medium

F13S-46 is an attractive yellow fruit. It has a similar shape as Improved French and harvests about 3 weeks before French. It blooms about 4-0 days before Improved French. It is not self-compatible, so it will be tested in 2010 for its compatibility with Improved French. F13S-46 has a medium to small sized pit. It dries to make a very sweet, pleasant tasting prune and has received very high ratings in our fruit tasting events. Preliminary pitting tests by a commercial processor were successful. It will continue to be monitored for its processing ability. This selection is very promising, many growers and processors are interested in seeing more of it planted in the coming years.

F11N-27 is a light purple, oval fresh fruit. It harvested about 2 weeks before French, and blooms about 6 days before French. In 2009, the Kearney selection block had a great crop and had high sugar as well. The dried quality of the fruit is good but there are some concerns about its suitability for commercial processing. It was ranked in the top 5 in the November 2008 and 2009 tastings. In a caged study, this cultivar was not self-pollinating.

D6N-103 is a high sugar prune that looks very similar to French in shape and color. The dried fruit is a shiny dark brown appearance with a meaty flesh. It is a larger prune than French and may do very well in a specialty market. It is versatile in the fact that it makes a great fresh pack plum as well. It would be ripe for fresh picking a week or two after Tulare Giant is finished. D6N-103 is not self-compatible and requires Improved French as a pollinizer. This cultivar has a tendency to have around 10% split pits. This might prevent it from moving any further in the program. The future of this selection depends on grower input, fresh pack growers are positive about it, but hesitate because of market conditions and the split pit issue.

F9N-21 is particularly interesting because it develops sugar early and remains firm for more than three weeks until it falls off the tree. The tree size is a little smaller than standard trees, some nursery trees will be made in 2010 to get an accurate sense of how dwarfing this tree might be. It might have the potential to decrease labor costs by reducing the need for pruning in the orchard. Its fruit develops color in late June, and becomes sweet around the 2nd week in July, it will increase sweetness and stay firm for about one month. This makes the harvest date hard to predict. The fruit will start to fall off the tree after the first week in August. In dried evaluations, F9N-21 has shown processing promise because it has a substantial flesh and skin. Its sugar content can be as high as 27-30° Brix and has a small, free pit. This selection might be a great option for growers who would like to better spread out the harvest season.

Level 2 Testing

Level 2 testing evaluates a selection after it has been promoted from the Davis seedling blocks to the advanced selection blocks at Kearney and Wolfskill. Whole tree and fruit characteristics are evaluated. Table 5 shows the harvest data of the top selections this year.

Table 5. 2009 Harvest data for advanced selections in Level 2 testing. The location designation after the harvest date indicates W (Wolfskill), K (Kearney). 'Days from French' refer to the difference between French harvest date and the harvest date of the selection at the same location. Harvest date listed is specific for locations where samples were collected.

Selection	Harvest Date	Days From French	Pressure (PSI)	Soluble Solids (%)	Fruit Size (ct/lb)	Crop Load
E7S-37	7/27 (W)	-35	5.2	25	48	Medium
F2N-32	8/3 (W)	-26	4.8	27.3	44	Medium
E3N- 42	8/3 (W)	-28	6.2	25	42	Medium
E6N-30	8/24 (W)	-7	6.1	25.3	40	Medium
E6S-12	8/25 (W)	0	5.7	27.5	47	Medium
E11S-47	9/14 (W)	14	5.8	23.9	38	Light

E7S-37 is an early harvest dried plum. It is unique in that it is green with a rose colored blush when ready for harvest. It dries to make a nice, dark brown fruit. E7S-37 usually harvests at the end of July (around 35 days before French). It will continue to be evaluated, but the program is hesitant to pursue this item due to potential grower aversion to its color at harvest.

F2N-32 is a yellow French-shaped plum. It bloomed 3 days before Improved French and was harvested about 3 weeks before Improved French. 2009 was the first year it produced fruit in the evaluation blocks so there is much to be learned about this selection. It produced an excellent tasting dried product that has durable skin and flesh, making it a good candidate for processing.

E3N-42 is a great purple dried plum. It harvests about 3 weeks before French. In past years it has produced excellent dried quality plums. This year the dried product did not meet the standards of this program. It will be critically evaluated for one more year, and if it continues to be sub-par, it will no longer be a candidate for Level 3, and only used for breeding.

E6N-30 is a high sugar prune for drying. When dehydrated it looks very similar to French. It is an attractive dark purple plum that has high sugar content. It harvests shortly after Improved French and produces a high sugar, large dried plum. There are some concerns regarding fruit shape (round) and tendency for cracking. These characteristics will be further evaluated before any grower trials are recommended.

E6S-12 is a light yellow plum that dries to a dark mahogany color. It has an outstanding dried flavor, but has a fairly thin skin that might limit its ability to be pitted. It harvests with Improved French and blooms 3 days before it. E6S-12 has an Improved French tree structure as well as fruit shape. Its harvest time and thin skin will be further evaluated to determine its suitability for commercial processing.

E11S-47 is a light rose colored prune when fresh, and a deep, attractive mahogany when dried. It harvests very late and has an excellent fresh and dried flavor. Thus far, the trees in the selection blocks have not produced any large crops. Lack of precocity and the ability to be shaker harvested need to be further evaluated before any grower trials are implemented for this selection.

Level 1 Testing

Level 1 testing evaluates the young seedling selections at Davis with fruit quality being the primary selection criteria at this level. The seedlings set nice, medium-sized crops this year with little need for thinning. Table 6 shows the harvest data of the top seedlings evaluated at Level 1 this year. The selections listed in Table 6 will be grafted into both selection orchards for further evaluation.

Program Inventory

All the seedling blocks are located in the UC Davis campus research orchards. In the summer of 2009, over 1,000 seedling trees were discarded after evaluation of the seedlings showed negative fruit or tree characteristics. The 2008 seed collected from controlled pollinations made in spring of 2008 were grown over the summer in pots at Duarte Nursery. These young trees were planted in October 2009 into our seedling blocks at Davis. This added around 300 new seedlings to the 'I' block (Table 7). One hundred and seventy samples were processed for the advanced rehydrated tasting evaluation in October with 103 of the samples coming from Level 1 seedlings.

Table 6. 2009 Harvest data for advanced selections in Level 1 testing at Davis.

Item ID	Days from French	Fruit Size (ct/lb)	Brix	Why of Interest:
G45N-35	-9	61	29.1	Good dried qualities
G39N-34	-41	62	20.9	small pit, great taste
G39N-57	-3	65.9	27.1	small pit, great taste
G33S-79	-3	53	26	good dried appearance
G35N-15	-3	44	26.3	good dried appearance
G31N-27	3	63	29.1	French like, good dried appearance
G37N-43	12	62	25.1	good dried appearance, free pit
G10S-29	-41	50	22.3	good dried flavor and small pit
G10S-8	-41	53	24.7	tough skin, good dried qualities
F3S-29	-40	49	29	Good dried qualities
G40N-34	-18	57	20.8	great taste, good flesh qualities
G33N-27	-3	47	27.2	Good dried qualities
G40N-32	-3	--	21.2	good dried flavor, small pit

Table 7. Seedling block inventories for 2009 located in the Davis UC research orchards.

Block	Acres	Year Planted	Seedlings Planted	Seedlings Remaining	Advanced Selections
G	8	2001-2005	6,756	4,214	44
H	4	2005- 2008	4,083	4,083	
I	2.4	2008-cont.	893*	893	
Seeds		2009		(~ 798) [♦]	
Totals	14.4		11,732	9,190 [^]	44

*includes 2009 October planting

[♦]number of seeds in stratification for 2010 planting[^]not including seeds

The inventories of selections at each level of testing are shown in Table 8. The numbers in this table represent the number of unique selections and not the number of trees. The “breeding population” category incorporates selections from our program and cultivars collected from other programs. The selections in the breeding population have some negative characteristics that do not permit them to become cultivars but show other positive characteristics that may make them important parents for future generations.

Table 8. Number of unique selections in the dried plum program and their level of testing including the breeding population.

Level of Testing	Number of Items	Number of new 2009 additions
Level 1	8,297	289 (~ 798 seeds)
Level 2	59	14
Level 3	5	1
Level 4	3	0
Breeding Population	97	13

Disease Screening

This year, mild to cool spring weather with a little rain did not seem to promote disease in any of our test orchards. No data was collected on brown rot. A few selections were evaluated for scab. If an item showed either of these diseases it was noted and the item was marked as more susceptible than the general population. Any genotypes documented as being more sensitive than Improved French are immediately discarded.

Dried Plum/Prune Testing Group

The Dried Plum/Prune Testing Group met in August this year at the Wolfskill Experimental Orchards to discuss strategies for testing and to tour the program's orchard. The group looked at fresh fruit and tree characteristics of top selections and discussed their potential as cultivars. The group met again in November in Davis and evaluated the dried fruit of the top selections (including French as a standard) and discussed their dried product characteristics. Tables 9 and 10 provide details on the fresh and dried characteristics of each of the selections tested. The group's evaluations and ratings for each of these selections are shown in Table 11 which is sorted by 'Flavor' score.

The two top rated dried plums this year was F13N-46 and E6S-12. Other dried plums that were ranked toward the top of the list were F11N-27 and Sutter. French has routinely been rated in the lower third of all the dried plums evaluated. It is important to note that even a group of tasters who are very familiar with the Improved French cultivar characteristics prefer new and fruitier flavors above the old standard. Consumers should follow this preference trend when new cultivars are made available to them. This is exciting since it allows for the industry to think about new marketing opportunities and increasing the dried plum consumer base.

Table 9. The characteristics of the fresh fruit of the selections shown at the Dried Plum/Prune Testing Group meeting in November 2009.

Selection	Level of Testing	Harvest Date	Average Bloom days from French	Harvest Days from French	Location	Crop Size	Fresh Skin Color	Weight (ct/lb)	Internal Pressure (PSI)	% Soluble Solids (Brix)
E7S- 37	2	7/27	-7	-35	Winters	Medium	Green with Blush	48	5.3	25.0
F11N- 27	3	7/31	-6	-25	Kearney	Medium/Light	Light Purple	37	4.9	32.5
F13S- 46	3	8/3	-4	-26	Winters	Medium	Yellow	38.98	6.1	23.4
F2N- 32	2	8/3	-3	-26	Winters	Medium	Rose	44	4.8	27.3
F9N- 21	3	8/8	-6	-17	Kearney	Medium	Dark Purple	44.8	3.39	29
E6S- 12	2	8/25	-3	0	Kearney	Medium	Yellow	47	5.73	27.5
G31N- 27	1	9/2	--	3	Seedling	Medium	Light Purple	63*	2.9	29.1
G37N- 43	1	9/10	--	12	Seedling	Medium	Light Purple	62*	3.5	25.1
*size will probably change after grafting onto a rootstock										
Muir Beauty	4	8/10	-7	-21	Winters	Medium	Light Purple	38	3.0	22
Sutter	4	8/17	-0.5	-14	Winters	Medium	Purple	45	6.3	26.1
French	4	8/31	--	--	Winters	Medium	Purple	48	3.4	26.3

Table 10. The characteristics of the rehydrated dried fruit of the top 8 dried plum selections shown at the Dried Plum/Prune Testing Group meeting in November 2009. (Average flavor score by Bradley, DeBuse, and DeJong prior to the November meeting is on a rating scale of 1-5 with 5 being the best.)

ITEM ID	Dried Ct/lbs	Dry ratio	Dried Skin color	Surface Wrinkles	Surface Brightness	Shape	Pit Size	Pit Type	Flesh Type	Skin Quality	Average Flavor Score	Comments
E7S- 37	48	3.10	Brown	Average	Good	French	Med/ Small	Semi Free	Average	Adequate	3	Fruity, Green Fresh color
F11N- 27	37	2.52	Dark Brown	Average	Good	Round	Med/ Small	Semi Free	Goey	Good	4.75	High sugar!
F13S- 46	40	3.10	Red/ Brown	Average	Good	French	Small	Semi Free	Goey	Adequate	4	Good, yellow fresh color
F2N- 32	44	2.86	Brown	Average	Bright	French	Med/ Small	Semi Free	Meaty	Adequate	3.75	Looks similar to French, yellow fresh color
F9N- 21	45	2.65	Dark Brown	Average	Good	Oval/ Round	Medium	Semi Free	Meaty/ Average	Good	3	Cherry Flavor
E6S- 12	47	2.67	Mahogany	Average	Good	French	Small	Semi Free	Goey Average	Weak	4	Apricot Flavor
G31N- 27	63	2.74	Mahogany	Average	Bright	French	Med/ Small	Semi Free	Goey Meaty	Good	3.25	Looks like French
G37N- 43	62	2.92	Red/ Brown	Small/ Average	Bright	French	Medium	Semi Free	Average	Good	4	Variable size, will dry on the tree
Muir Beauty	38	3.41	Dark Brown	Broad	Good	Round/ Oval	Medium	Semi Free	Goey	Weak	4	Released in 2004
Sutter	45	2.82	Mahogany	Average	Bright	French	Medium	Semi Free	Meaty	Good	4.5	Released in 2000
French	48	2.94	Dark Brown	Average	Bright	French	Small	Semi Cling	Meaty/ Average	Excellent	2.5	Standard

Table 11. The average testing group scores (1=worst, 5=best) given to the characteristics of the selections shown at the Dried Plum/Prune Testing Group meeting in November 2009, sorted by 'Flavor'.

Selection	Flavor	Skin Color	Skin Quality	Fruit Size	Pitting Quality	Flesh Color	Flesh Texture	Average overall	Comments
F13S-46	4.25	2.93	3.33	3.93	2.87	3.63	3.73	3.52	Fruity, Good pit to flesh ratio, speckled skin
E6S-12	4.16	2.77	2.47	2.97	2.53	3.70	2.93	3.08	Very fruity, thin skin, dull appearance, small pit
G37N-43	3.93	3.90	3.77	3.63	3.93	3.79	3.73	3.81	Good, honey flavor, meaty, loose pit
F11N-27	3.78	3.34	3.44	3.25	2.88	3.63	3.50	3.40	Very fruity, good taste, orange flesh, large pit
Sutter	3.78	3.44	3.53	3.20	4.00	3.59	3.43	3.57	Best flavor, long free pit
F2N-32	3.25	3.72	3.31	3.25	3.25	3.31	3.25	3.33	Best flavor, semi free pit, French like, soft texture
Muir Beauty	3.16	3.33	2.79	4.00	3.00	3.27	3.00	3.22	Fruity, thin skin, stringy flesh
G31N-27	3.14	3.60	3.57	2.92	3.80	3.40	3.33	3.39	Good, slight acid, meaty flesh and large free pit
F9N-21	3.10	3.53	3.47	3.25	3.67	3.13	3.44	3.37	Slight acid, apple flavor, small free pit
E7S-37	2.88	3.97	3.75	3.22	2.81	3.27	3.53	3.35	Tangy, dark flesh color, free pit
French	2.65	4.04	3.25	3.29	2.86	3.54	3.00	3.23	slight acid, not much flavor thick skin, meaty

RELATED STUDIES

Relationship between accumulated growing degree hours 30 days after full bloom and harvest date for “Improved French” prune

It has been established in peaches, Japanese plums, and nectarines that the accumulated temperatures (GDH or growing degree hours) in the first 30 days after full bloom are highly correlated to the date of harvest (Ben Mimoun and DeJong, 1999). This correlation can be used as a predictor of the future harvest date. To see if a similar relationship exists in dried plums/prune, the harvest dates of French collected at UC’s Wolfskill Orchard (Winters, Yolo County) and Kearney Research and Extension Center (Parlier, Fresno County) over the last eight years were correlated to the associated accumulated GDH 30 days after full bloom for each year. A relationship was found in French prune that is similar to what has been found in the other *Prunus* crops (Figure 2).

This relationship signifies that the spring temperatures in the first 30 days after full bloom govern fruit developmental rates and are a major factor in determining the harvest date in any given year. The relationship can be used as a tool, early in the season, for growers to estimate harvest date for French. This can be easily accomplished, 30 days after bloom, by going to the UC Fruit & Nut Research and Information Center web site- (<http://fruitsandnuts.ucdavis.edu>). Once there, select ‘Weather Services,’ then ‘Harvest Prediction Model.’ Select the location of your nearest California Irrigation Management Information System (CIMIS) weather station and enter the date of full bloom. The data that will be shown are the accumulated GDH during the first 30 days after bloom. Using this number, you can extrapolate from the figure below (Figure 2) and estimate how many days there will be from full bloom to harvest for that year. As a resource, this figure will be linked to the page labelled ‘About Growing Degree Hours’ found under ‘Weather Services’.

The prediction of this year’s Improved French harvest date using this method was estimated at August 27th at Wolfskill, approximately 155 days from full bloom to harvest. For Kearney the harvest date of French was predicted to be about August 26th, approximately 159 days from full bloom to harvest. This estimate was mostly correct for Kearney, but about 3 days early for Wolfskill. Actual harvest for Wolfskill was August 31st and for Kearney August 25th. This year, dried plum growers across the state began harvesting before our Wolfskill harvest date.

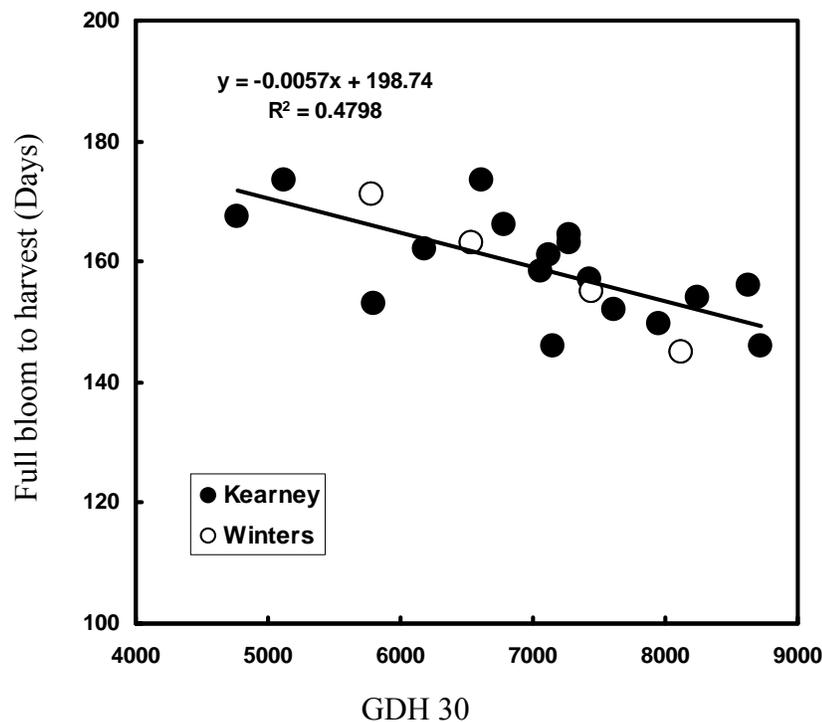


Figure 2. Relationship between growing degree hours (GDH) 30 days after full bloom and the number of days from full bloom to harvest for the cultivar ‘Improved French’ at Kearney and Winters.

DONATIONS

We would like to thank Duarte Nursery Inc, for the donation of nursery care of the program’s 2009 seedlings. We would also like to thank Pacific Western Container for donating the tree protectors for the 2009 seedling planting at Davis. Their generosity helps support UC research and the California dried plum industry’s goal in developing new dried plum cultivars for California.

REFERENCES

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