

Spring 2014

From the **Grove**

The Latest News from the California Avocado Industry



Inaugural Pine Tree Field Day a Huge Success

Read more on page 26.

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Ernie Righetti and Bob Siemer- Righetti Ranch

In fond memory of Ernie Righetti and all he contributed to the avocado industry- his knowledge, passion and friendship will be dearly missed.

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Pine Tree Ranch Field Day

26

From the Grove

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Tom Bellamore

The Imperative of Sustaining Demand

Since 2002, our nation has been the world's largest import market for avocados. The United States became a net importer of avocados in the late 1980s and there has been no looking back. Current demand hovers around 1.7 billion pounds, matching the available supply that is largely comprised of imports. With a U.S. population of 317 million, that places per capita consumption of avocados at 5.4 pounds—noteworthy, but far short of Mexico's 20 pounds per capita, which suggests room for growth remains. And thank goodness.

Between 1999 and 2013, the annual rate of growth in U.S. avocado consumption has been close to 10 percent. That steady rise in demand has attracted new entrants into the U.S. avocado market, such as Spain and Hawaii, both approved for importation by the U.S. Department of Agriculture (USDA) in late 2013. Although the potential volume expected from these two suppliers is relatively small, perhaps less than 2 million pounds, consider those who are next in line awaiting USDA authorization. At the top of the queue is Mexico.

Yes, you read that correctly. From a regulatory perspective, since

1997 avocados from Mexico have meant avocados from Michoacán, the only state in Mexico approved to export the fruit to the United States. It is widely known, however, that Hass avocados are grown in other Mexican states such as Jalisco, Veracruz, Colima, Sinaloa, and Nayarit. Producers in these and other areas of Mexico have been working toward export certification, conducting pest surveys and field sanitation measures in some cases for years, all with the aim of emulating their successful peers in Michoacán. Not long ago, the government of Mexico stepped forward on their behalf, petitioning USDA to expand the Mexican avocado import program to include *all* of Mexico.

For some time now, the unofficial word has been that Jalisco is “next in line.” Neither USDA nor its Mexican counterpart, the Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesca y Alimentacion (SAGARPA), are anxious to relive the contentious rulemaking that accompanied the opening of the U.S. market for Michoacán growers, however, which makes a state-by-state approach unlikely. One further rule change allowing access for all avocado producers in Mexico is far more palatable to USDA and SAGARPA

than a series of rule changes each time another Mexican state is ready to meet the export requirements. Expect to see a strong indication of that in the near future, when USDA publishes a draft Pest Risk Assessment for the importation of avocados from Mexico—i.e., *all* of Mexico.

The current avocado import program, in spite of its rough beginnings, has functioned relatively well when it comes to containing risks associated with avocado pests not known to occur in the United States. Going forward, Michoacán and California avocado growers share a common, vested interest in making sure the program performs as designed if expansion is permitted. Neither group wants to see a pest infestation in California or the market disruption that would ensue.

For this reason, in January 2014 the unthinkable occurred. Representatives from the Asociacion de Productores y Empacadores Exportadores de Aguacate de Mexico A.C. (APEAM) and the California Avocado Commission jointly called upon USDA, urging the department to take a reasonable, methodical approach to expansion. Together, we proffered a proposal seeking a staged approach to expansion.



Save Water • Cleanse Soil • Improve Yield

The **DROUGHT** has hurt us all! Our groves have not been rainwater leached since spring 2010. It gets worse ... the 2014 district water will have 2.5x more Colorado River water, and wells are getting saltier as the water table goes down.

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Matt Hand, SoCal Entomology & Grower

“I credit my **ECOFLOW** with additional productivity and healthier trees overall.”

Ralph Foster, 2013 Winter From the Grove: Grower Profile

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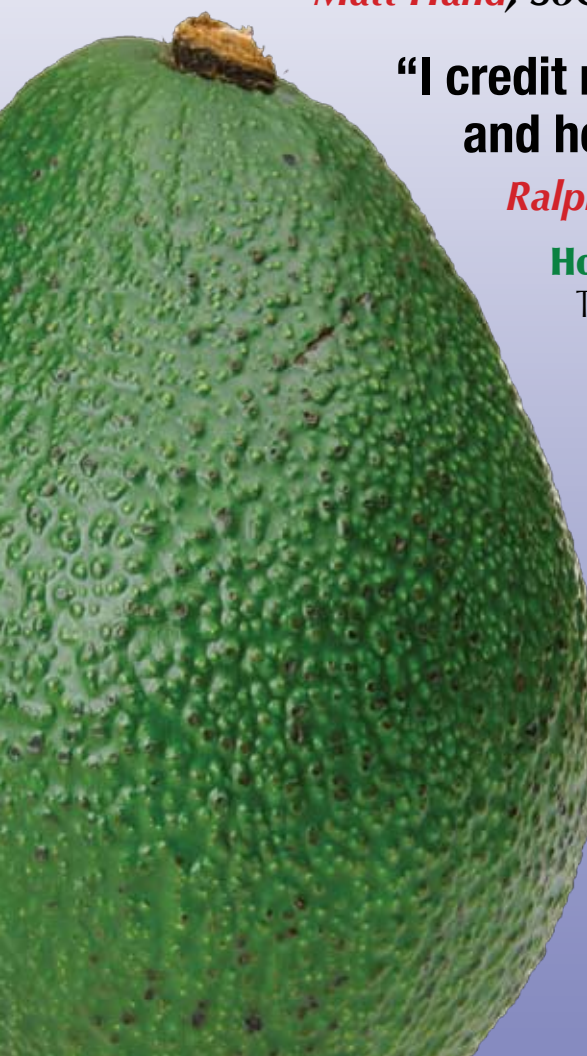
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To contact a CAC representative, please visit:
CaliforniaAvocadoGrowers.com/Commission/your-representatives

The proposal contemplates a new regulation that: 1) would enumerate and codify the necessary phytosanitary requirements each producing area must meet, and 2) set forth administrative procedures for a government-to-government petition process. The USDA's initial reaction to the idea was positive.

Regardless of what form it takes, expansion of the Mexican avocado import program will undoubtedly mean significantly more volume in the United States, much of which could overlap with the California season. Jalisco alone may be poised to export anywhere from 150-300 million pounds depending on market opportunities, with production that is heaviest in the summer months.

Equally as daunting is the ramping up of volume from Peru, which already has full access to the U.S. market. Analysts there peg export potential at 200-300 million pounds in the not-too-distant future.

Further down in the queue are these countries, each of which appears on the list of in-progress risk

analyses being performed by USDA: Argentina, Australia, Columbia, Ecuador, Philippines and South Africa.

But it is Mexico and Peru that keep me awake at night—if for no other reason than the others have lower production capacity or will face logistical challenges getting their fruit to the United States.

If there is a silver lining in all of this, it has to be the \$40 million collectively being funneled into promotion by all of the avocado associations, import and domestic alike, to fuel the U.S. market. Each association has its own brand-building strategy, and for California avocados, it is all about premium positioning due to our high costs of production.

Sustaining market growth at 10 percent or above must be a common goal, however, because the market will only remain profitable if supply does not overrun demand. APEAM knows it. CAC knows it. The question is, will the new entrants temper their enthusiasm and promote as hard as they sell? 🥑

Chairman's Report

Spring!

I'm looking out a window overlooking my grove in back of our house as I write this. I see young avocado trees starting their spring flush, bloom developing and can hear birds singing as they build their nests on a warm spring day. The only problem is that it is late February, and the warm weather started two months ago.

In the area where I farm, we had a late, dry and hot fall, shared the 10-day cold snap in early December with most of the state, then went straight into six weeks of hot, dry windy weather with almost no relief from our normal winter rains. The severe drought in California is entering its third year. Hopefully by the time this gets to print we will have at least a couple of inches of rain soaking into the leaf litter under our trees, but right now the long term outlook is harsh. The weeks of wind and single digit relative humidity have made tip burn a general condition in many groves. We have shut down our own irrigation sets just twice this winter and each time for only a few days. I met with my foremen at 6:15 this Sunday morning (Feb. 23) to review our current 24/7 irrigation schedule. Irrigation costs in our area are many times the average for this time of year.

The more I think about the current water crisis in California, the more pleased I am with the California Avocado Commission's (CAC) long-term policy of making water issues a high priority. We are fortunate to

have the long-time industry leadership of Charley Wolk heading our Water Committee. Under the direction of our President Tom Bellamore, CAC Director of Issues Management Ken Melban roams the halls of Washington, D.C., Sacramento, the Metropolitan Water District offices in Los Angeles and local water agencies to put our water concerns on the top of everyone's priority list. Thanks to Ken, I was able to represent CAC at a recent Water Resources Roundtable with our local Congresswoman Julia Brownley.

It is important that our elected officials understand that avocados are not at all like annual crops where you can decide to plant or fallow each year. For us, after a two-year wait for \$30 trees, we wait another four to five years to reach high production. Our industry is almost entirely irrigated with modern, efficient application technology that enables us to carefully place the right amount of water where it is needed with little waste. Every grove has a particular minimum amount of water that is required by the trees to sustain health, growth and crop volume. Any cut in water use can mean drastic changes in a grove. You will find some useful drought management strategies a little further on in this publication.

Tom, Charley, Ken and others have been working on grower issues related to imported water for years. This has been primarily a "southern" issue for California growers that has been supported by all growers



Ed McFadden

throughout the state. It is certainly a twist to find that for now, the high-cost imported water appears to be in good supply, while the wells of many "northern" growers are dropping to critical levels. One way or another, the current water crisis is a problem for all California avocado growers.

The good news so far for this winter (if you can call it a winter) is that apart from the cold snap that did so much damage in the San Joaquin Valley, it has been a fairly mellow winter (so far) with regards to cold. I've been out fighting frost less than 10 nights this winter (so far) compared to 33 nights "out" last winter. There has been some frost damage in pockets but for the most part we have seen less damage than last year.

The best news is that if you have fruit on your trees this "off" year, it's going to be worth something special. Our average returns now are much better than this time last year. In fact, they are similar to the strong returns in the last quarter of our previous crop year. Talk to your handlers and make plans to maximize the value of each precious piece of your premium California fruit while balancing your harvest with the long-term cultural needs of your grove. Tom Bellamore, Jan Delyser and the entire CAC staff have been busy "setting the table" for us; it is time for us growers to get this season started. 🥑

Coping with Drought

By Tim Spann

Research Project Manager

By now everyone in California agriculture is well aware of the severe drought conditions throughout much of our state. It is a drought of superlatives – historic, unprecedented, extreme, exceptional – and there is no doubt that California's agricultural commodities, including avocados, are going to suffer this year. The U.S. Drought Monitor, a national program begun in 2000, now reports that more than 60 percent of California is under extreme or exceptional drought. This is the first time since the monitoring program started that exceptional drought has been recorded in California. It is important that California avocado growers begin to take steps, if they haven't already, to cope with the severe drought.

Impacts of Drought

Avocados are not adapted to hot, dry climates. They are native to the mountain cloud forests of Mexico and Central America where temperatures are cool (55 to 70°F) and rainfall is high (25 to 60 inches). As a result, they have shallow root systems (80 percent of roots are in the top 18 inches of soil) where they scavenge the nutrients from rapidly decomposing organic matter. Under drought conditions, avocado leaf stomates close to reduce water loss from transpiration, resulting in reduced photosynthesis. Over time, continued drought will result in the trees exhausting their carbohydrate reserves, reducing yield and growth.

Perhaps more important in California is the interaction of drought and salinity. Without rainfall to help leach salts from our soils, salinity builds up and becomes toxic to avocado trees, which are very salt sensitive. Figure 1 shows how normal microsprinkler irrigation pushes salts out of the root zone, but salts accumulate between trees and below the root zone. We rely on rainfall to periodically flush the salts from the areas not normally wetted by the microsprinklers. Without rainfall, the red zones (high salts) become larger, and in time it is not possible to keep the salts from entering the root zone. High salts inhibit plant water uptake and exacerbate drought conditions.

Coping with Drought

Since avocados are drought sensitive, the only real solution to drought is more water. Thus, strategies for coping with drought focus on maximizing the use of what little water is available by improving efficiencies and prioritizing where water is applied.

1. Irrigation System Maintenance

Probably the single best thing most growers can do to save water is to inspect, maintain and repair their irrigation system. Poly hoses should be inspected for leaks and



A map of California from the U.S. Drought Monitor showing the severe drought conditions covering much of the state as of February 13, 2014. More than 60 percent of the state is under extreme or exceptional drought conditions.

repaired if necessary; and clogged, broken or missing sprinklers should be repaired or replaced.

If you have not previously had the distribution uniformity (DU) of your system checked, or if it has been a number of years, now would be a great time to do it. Many of the water management districts perform this service for growers or they can refer you to a company that can perform the test. Avocado growers should aim to achieve at least 85 percent DU. Even for a small grove, improving the irrigation system DU by a few points can result in big water savings.

DU directly affects how much water you need to apply. For every percentage point your DU is below 100, you need to apply that much more water to ensure that each tree receives the water it needs. For example, if you are trying

to apply 100 gallons per tree and your DU is 75 percent, you will need to apply 125 gallons per tree to make sure that all trees receive 100 gallons. However, some trees will then receive 125 gallons, which could lead to over watering and exacerbate root rot or other root health issues. An easy way to improve your system's DU is to install pressure regulators on all lateral lines and consider installing pressure-regulating sprinklers. If your grove is on a slope, these are must-have items to prevent the trees at the bottom of the hill from drowning while those at the top don't receive enough water.

2. Soil Moisture Monitoring

A recent survey conducted by University of California (UC) Riverside researchers, and funded by the Giannini Foundation of Agricultural Economics, found that 60 percent of California avocado growers never monitor soil moisture. And of those who do monitor soil moisture, most do it by feel. Utilizing a set of soil moisture sensors, such as tensiometers, to monitor soil moisture and determine when to water can greatly improve water use efficiency and prevent your trees from becoming too stressed. Dr. Gary Bender, UC farm advisor, has a great YouTube video explaining how a tensiometer works and how to install one in an avocado grove (www.youtube.com/watch?v=UHVlvAO5NDQ).

Although tensiometers or other soil moisture sensors can help you determine when to water, they do not tell you how much water to apply. To determine how much water your avocado trees need, you should use an irrigation calculator such as the one available on AvocadoSource.com (www.avocadosource.com/tools/IrrigationCalculator.asp).

3. Root Rot and Sunblotch Infected Trees

Most California avocado growers probably have some trees that are affected by root rot, *Phytophthora cinnamomi*. These trees can be chemically treated and, under good conditions, they can be maintained and be productive. However, chemical treatments are not curative, and these trees will be more sensitive to other stresses like drought. Root rot-affected trees should be carefully evaluated to determine if they are producing an economically sustainable yield. If not, they should be removed and the sprinklers capped.

Avocado sunblotch viroid (ASBVd) infected trees are less common than root rot infected trees, but they are out there. Typical symptoms are discolored and depressed stem streaks, grooves on older branches, and yellow grooving on the fruit. There may also be symptomless trees whose only symptom is a lack of production. ASBVd-infected trees should be removed and the sprinklers capped.

4. Tree Maintenance

Some groves have trees that have canopied over and are too tall to be managed efficiently, and these trees can cost more to harvest. This year would be a good time to stump these trees since it's probably a task you've been putting off

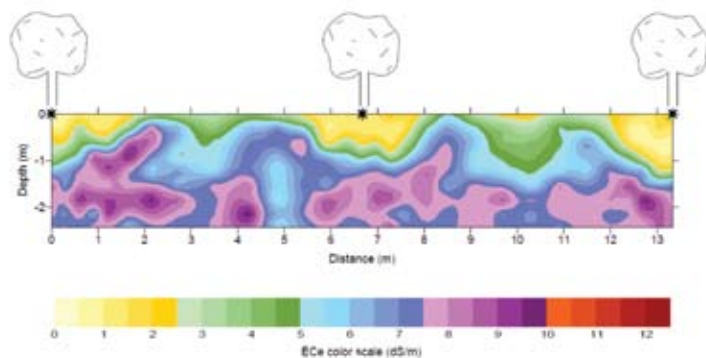


Figure 1: A diagram showing how salinity accumulates outside the wetted zone in an orchard irrigated with microsprinklers. The yellow regions represent low salinity immediately below and around the microsprinkler; the blue to red areas indicate high salinity accumulation between trees and below the root zone. (Diagram from: *Soil Salinity Accumulation in Orchards with Drip and Micro-spray Irrigation in Arid Regions of California, Irrigation and Training Research Center Report No. R 03-005*, <http://www.itrc.org/reports/pdf/treecropsalinity.pdf>.)

anyway. Tall trees can be stumped back to 4-5 feet, painted to prevent sunburn, and the sprinklers capped for about two months. Once regrowth starts, the water can be turned back on and gradually increased as the canopy redevelops.

If you have trees in a wind-exposed area that suffer wind damage every year, this may be the time to stop investing resources in those trees and take them out of production.

Pruning trees, although often necessary, is not a good strategy to reduce water use. Pruning opens windows into the tree canopy, exposing previously shaded leaves to sun and increasing air flow. Both of these effects can result in greater water loss from the remaining leaves, counteracting the water savings from the removed leaves. Thus, pruning may result in a slight water savings at best.

Mulching trees is a good way to help reduce water use by reducing evaporation from the soil, decreasing runoff, and improving soil permeability and water holding capacity. Since mulching can be a costly investment, you should focus on your most productive areas and young trees that may not yet have a large root system. Apply three to six inches of mulch beneath each tree extending out to or just beyond the edge of the canopy. Be sure to keep the mulch a few inches away from the tree trunk so as not to encourage trunk canker or collar rot, caused by *Phytophthora menzei*. When possible, use material from within the grove (prunings or chipped limbs from stumped trees) as mulch. If you have to bring mulch in from outside the grove, try to source it locally to prevent the spread of pests and disease, such as the polyphagous shot hole borer and fusarium dieback disease.

No one can predict how long this historic drought will last. However, by taking some steps to improve water application and use efficiency, and focusing available water on the most productive areas of a grove, we can ensure that California's avocado growers remain productive. 🥑

Increasing Demand for California Avocados Through Consumer Advertising

A preview of the 2014 California avocado advertising campaign

Over the years, the California Avocado Commission has been able to create a preference for California avocados. Of those consumers who understand there is a difference between avocados from different countries, 85 percent prefer California avocados to imported avocados. These consumers also view California avocados as the best in regards to freshness, food safety, premium quality, reliability and taste. (See Chart A)

Since 2009, the percentage of avocado shoppers looking for an avocado's country of origin has also steadily increased, rising from 23 percent that year to 45 percent last year. (See Chart B)

For the 2014 season, the consumer advertising campaign will build on these successes and strive to increase in-season demand for California avocados in target markets by encouraging more shoppers to look for California on the label. To accomplish this, the campaign will stress that all avocados are not created equal by highlighting the premium attributes of the California avocado. The following differentiators are unique to California avocados and make them the premium avocado.

- **California avocados are only available for a limited amount of time.** Because California avocados are only available during a limited time frame, there is a strong call to action for consumers to get them while they can.
- **California avocados are grown in ideal locations.** Similar to certain wine varietals, there's only a small area of California (0.05 percent of the state) where California avocados are grown. They are shipped at their prime to ensure consumers enjoy every tasty bite.
- **California avocado growers use care and craftsmanship to bring California avocados to market.** After planting the seedling, a grower nurtures the tree approximately four years before it bears fruit. Also, once fruit develops on the tree, it takes more than 12



months before it's ready to go to market.

Even though the Commission has touched on some of these attributes in previous campaigns, this year we are focusing more attention on each of these differentiators to convince consumers the only way to ensure they consistently get the best tasting, freshest avocado is to look for the California label – the symbol of premium quality *Hand Grown* avocados.

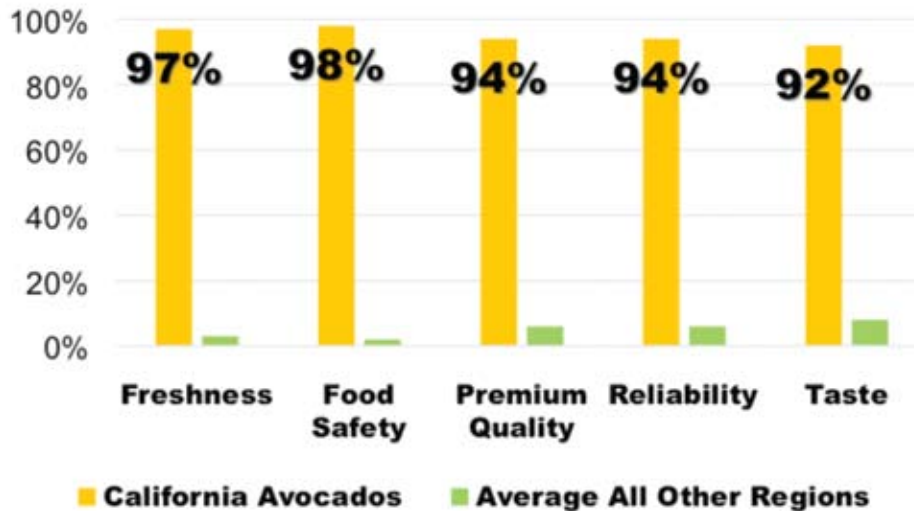
Some of the headlines for the print campaign will pose questions that lead to stories about the various competitive advantages noted above. For example:

- “Ever Wonder If California Is The World’s Best Place For Growing Avocados?”
- “Doesn’t It Seem That Avocados Taste Better In The Summer?”
- “Ever Wonder Why California Avocados Are Grown On Small Family Farms?”

Billboards also will highlight the local origin of California avocados.

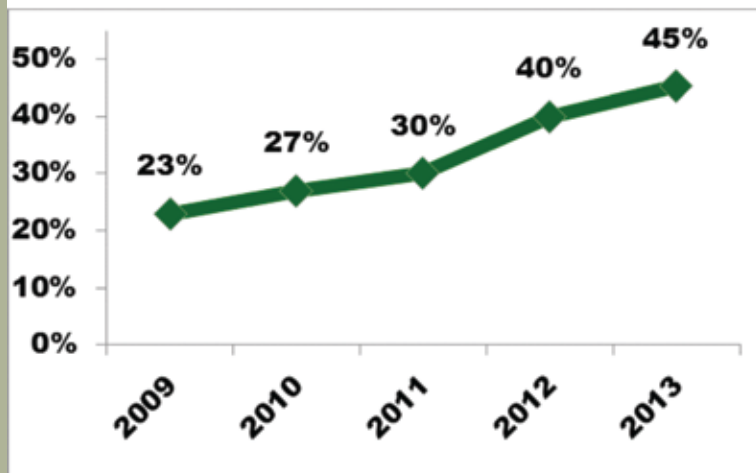
The consumer advertising media plan will run in most core California avocado markets (California, Portland, Salt Lake City and Seattle) from late April through Labor Day, and from June through mid-August in Denver and Salt Lake City. The markets were selected by analyzing avocado ship-

CHART A: Consumers Prefer California Avocados



Source: Bovitz Inc., 2013 California Avocado Commission Tracking Study

CHART B: Percentage of Avocado Shoppers Looking for Country of Origin



Source: Bovitz Inc., 2013 California Avocado Commission Tracking Study

ments and availability in various cities during the past five years, reviewing the projected 2014 crop size and with input from CAC's Marketing Advisory Committee.

The premium California avocado messaging will run throughout these markets and we will utilize general market radio and outdoor billboards as our primary media to reach our target consumers. Frequent radio messages keep California avocados top of mind and allow us to tag local retailers for their promotional support. Strategically placed billboards in high profile locations during the season will highlight CAC's messaging and keep it top-of-mind. In-grocery radio will remind consumers to visit the produce

section and purchase California avocados.

We also will reach our target audience while they are looking for new recipe ideas through print in regional magazines, on the Internet and via social channels. *Sunset* magazine continues to be the strongest print medium to reach CAC's targets in the West. Sponsorship of "America's Test Kitchen" provides CAC with a national presence. The show airs in more than one million households per episode and provides strong support for CAC's digital and social efforts.

CAC's consumer advertising campaign is positioned to drive consumer demand and deliver value for the California avocado industry this season. 🥑

The Architecture of Avocado Trees and Why it Matters

All tree crop growers struggle to balance Mother Nature's natural tendencies with their desire for high, consistent fruit production. To do this, they manipulate the trees by pruning, trellising, controlling fertilizer and water inputs, and using chemical growth regulators. The challenge to achieving high, consistent yield in avocados is arguably more difficult than in other tree crops that have been domesticated for thousands of years and have been bred so heavily that they bear little resemblance to their wild relatives. To manipulate an avocado tree horticulturally, we need to understand how it grows because we ultimately have to work within Mother Nature's bounds.

In general, avocado trees have a round canopy with dense foliage, but the form of avocado trees vary — Fuerte are characterized as spreading; Hass as rounded; Bacon as upright. The form of the avocado tree is also influenced by the predominance of proleptic and sylleptic shoots and this, in turn, can influence avocado yields.

In general, avocado trees grow in a rhythmic pattern with periodic — or seasonal — shoot growth. Shoots grow, then stop; grow, then stop. In California, shoot growth usually consists of a spring flush (reproductive), an early summer flush (vegetative) and an autumn flush (vegetative) (Fig. 1). This is important to recognize because this rhythmic pattern of dormancy and growth

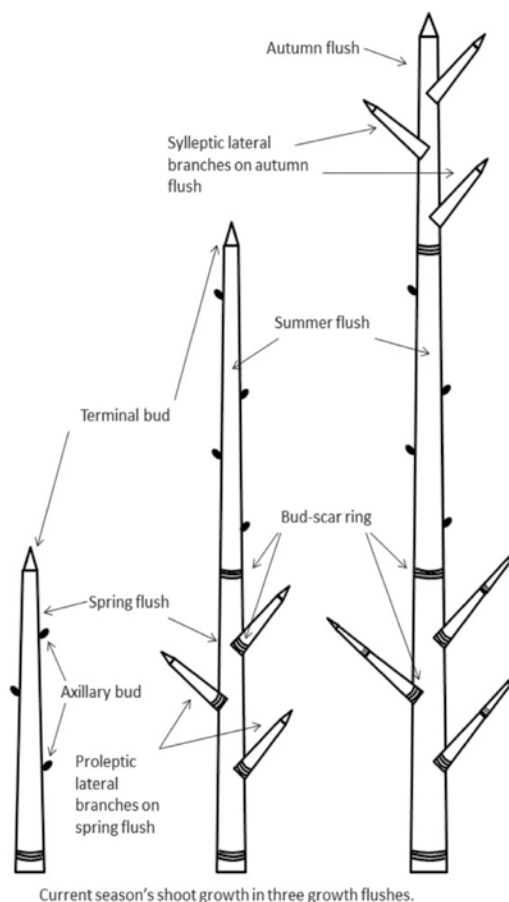


Figure 1. A diagram showing the current season's shoot growth arising from a terminal bud from the previous season. The current season's growth occurred in the three flushes, with the formation of a terminal bud in between each flush. The remains of the terminal buds are visible later in the season as bud-scar rings between each flush. The diagram shows flushes with two types of lateral branches — proleptic and sylleptic. The spring flush developed with no lateral branches (strong apical dominance), thus the axillary meristems became axillary buds (left). The spring flush axillary buds grew at the same time that the summer flush elongated, forming proleptic branches on the spring flush (note the bud-scar rings at the base of these lateral branches; center). On the autumn flush, axillary meristems grew at the same time the main axis was elongating (weak apical dominance), forming sylleptic shoots (note the absence of bud-scar rings on these lateral branches; right).

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Types of Buds

by Location



Terminal



Axillary

Figure 2. An illustration showing the location of a terminal bud at the shoot tip and axillary (lateral) buds along a shoot where the leaves join the shoot.

plays a role in determining which shoots develop when.

Proleptic (or unbranched) shoots develop from dormant terminal or axillary (lateral) buds (Fig. 2) once the parent shoot has stopped growing (Fig. 1). Proleptic shoots have a bud-scar ring at their base and can be vegetative or reproductive. Because proleptic shoots originate from dormant buds, their growth is considered “fixed.” That is to say, the number of nodes the shoot will have when it grows is pre-formed (microscopically) within the dormant bud.

On the other hand, sylleptic (or multi-branched shoots) develop from axillary buds while the main shoot is still growing — without there being an intervening bud dormancy period

— and do not have a bud-scar ring (Fig. 1). Because they do not arise from dormant buds, sylleptic shoots do not have pre-formed nodes, and can continue to grow if conditions are favorable (“free” growth). Ideally, avocado trees should have a mix of proleptic and sylleptic shoots for maximum productivity.

The form of an avocado tree is due to the interaction between apical dominance and apical control. Together, these determine the dominance of proleptic or sylleptic shoots of a tree.

Apical dominance is the extent to which an actively growing shoot tip or terminal bud inhibits the growth of axillary buds (at the junction of the stem and leaf) further down the shoot. In short, when an avocado tree forms a lateral meristem, apical dominance determines whether the meristem forms a bud or a sylleptic branch. The growing shoot tip or terminal bud produces the plant hormone auxin, which inhibits the growth of lateral buds. (Growers imitate this response by applying Tre-Hold, a synthetic auxin, to pruning cuts to prevent shoot growth.) Apical dominance is used to refer to the control the apical portion of a shoot has over lateral buds along that shoot during the year that the shoot first grows. Because apical dominance inhibits the growth of axillary buds when the shoot main axis is extending, it involves the inhibition of sylleptic — not proleptic — shoots.

Apical control refers to the influence apical portions of the crown have over the general tree form by releasing resting buds in subsequent years of the tree’s life. How apical control is manifested determines tree form. Acrotony is a specific type of apical control in which the buds closest to the terminal of the shoot are released from dormancy and become dominant over the main shoot axis (Fig. 3). Basitony is a type of apical control in which the buds closer

to the base of the shoot are released from dormancy and do not become dominant over the main shoot axis. A tree with strong apical control (basitonic growth) will have the central axis remain dominant and thus will have one clearly defined trunk. A tree with weak apical control (acrotonic growth) will have several large major limbs or scaffold-like branches.

Apical control takes place in the second and subsequent years of shoot growth when apical control either a) leaves the bud dormant or b) allows the bud to reawaken and elongate and thicken into a proleptic branch. Buds that remain dormant enter what is commonly referred to as the “bud bank” and can later form epicormic shoots, or water sprouts, generally in response to major limb breakage or severe pruning (e.g. stumping). While auxin plays a role in apical dominance — and thus the development of sylleptic branches — its role in apical control is less clear. Researchers are examining hormonal and nutritional mechanisms to better understand their role in apical control.

When you put all of these factors together — apical dominance, apical control, acrotony, basitony — you can begin to understand why avocado trees take the form they do. Researchers examining shoot growth and tree architecture discovered the following:

‘Gwen’ and ‘Reed’: strong apical control, strong basitony, few major limbs, short axillary shoots, few proleptic shoots, weak apical dominance and large numbers of sylleptic shoots. Tends to be a more compact tree.

‘Sharwil’: weak apical control, strong acrotony, many major limbs, long and numerous proleptic shoots, strong apical dominance and few sylleptic shoots. Tends to be a taller tree.

‘Hass’: intermediate between ‘Sharwil’ and ‘Reed.’ Tends to be of

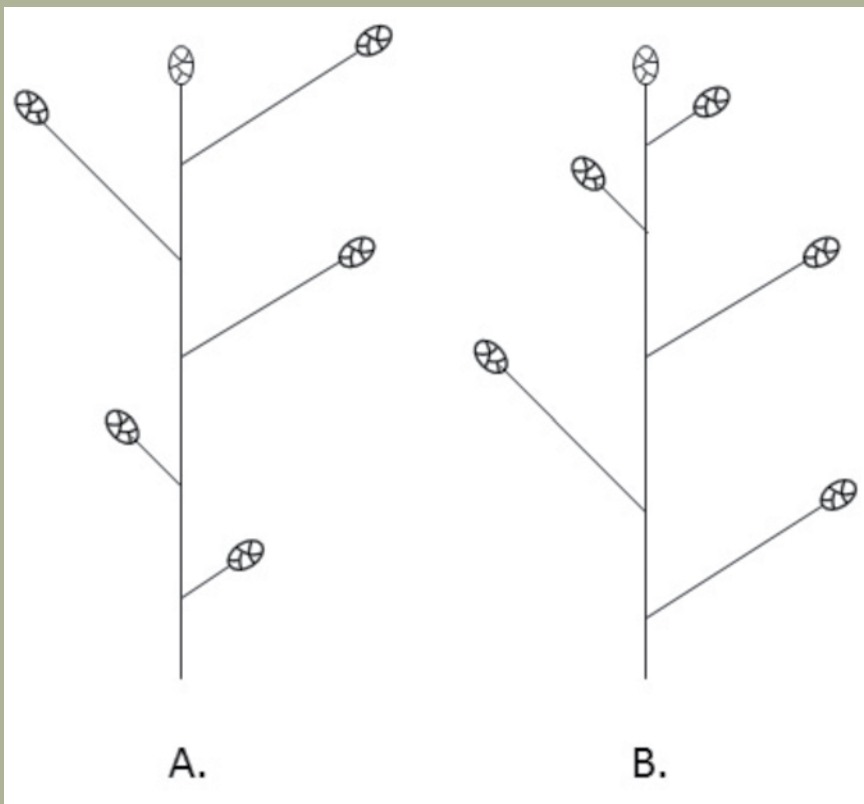


Figure 3. A representation of two types of lateral branch development, acrotonic (A.) and basitonic (B.).

intermediate size.

Researchers have also found that the tendency to develop proleptic or sylleptic shoots is dependent upon the age and the location of the grove. They found that younger avocado orchards tended to have more sylleptic shoot development, while proleptic shoot development increased as orchards aged. This is in keeping with research noting that apical control (and thus proleptic shoot development) takes place in later-stage growth. Researchers continue to examine the effect grove location plays on avocado shoot development.

The concepts presented here describe characteristics of avocado tree growth in its natural state. In the next issue of *From the Grove*, we will examine how understanding these concepts allows us to make management decisions (e.g., pruning) to manipulate tree growth to try to improve yields and fruit quality. 🥑

Terminology

Apical control – the control of growth of proleptic branches

Apical dominance – the inhibition of growth of sylleptic branches leading to the formation of axillary buds

Epicormic shoot – rapidly growing, near vertical shoots that develop from buds that have been dormant for more than two years (commonly referred to as water sprouts)

Meristem – a region of undifferentiated cells in a plant that is found where growth can take place; meristems are found in areas such as shoot tips, lateral buds, and root tips

Proleptic shoot – lateral branches that develop from axillary buds after a period of dormancy

Sylleptic shoot – a lateral branch that develops from an axillary meristem without a period of dormancy while the main shoot axis is still

Grower Profile



Jeff Dillman, North San Diego County

Fallbrook via Utah

By Tim Linden

For more than two years now, Jeff and Kim Dillman have been commuting from their old home in Utah to their new one in Fallbrook. With their youngest daughter, Breann, heading into her final high school semester, the Dillmans are poised to officially sever the Utah connection and completely move into their North San Diego County home, complete with 290 avocado trees, 95 percent of them of the Hass variety.

"I grew up in Downey, CA, but my family moved to Utah when I was 15 or 16 years old," said Jeff.

He has spent several decades there as he finished his schooling, got married and raised a family. A few years ago with some of the five kids moved out and the specter of the empty nest nearing reality, Pam Dillman indicated a desire to move to Southern California. The Dillmans began looking and it wasn't that long before they found a place to their liking that included 2.5 acres of avocados. Though the Dillmans had never been involved in agriculture in any meaningful way, the inclusion of the avocado grove wasn't just by happenstance. "Once we started looking it became obvious that there were a lot of avocado groves in the area (with houses attached) and so that's what we started looking for," he said.

"We bought in November of 2011," Jeff said. "At first, we rented out the house and hired a grove manager."

And thus began the Dillman's crash course in avocado growing 101.

Soon thereafter, the Dillmans established that they would



Jeff Dillman

complete the move to California in June of 2014 after their youngest daughter graduates from high school. In the meantime, the couple made many trips to the Golden State to tend the grove. "We decided to do the pruning ourselves," Jeff reported.

He explained that the grove was overgrown so he has been "stumping" the trees little by little over the past couple of years and expects to complete the job over the next several years. "Some of the trees are over 50 feet tall and it is impossible to pick all the fruit."

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He and his wife are cutting them back to about five feet. The first trees he cut in 2012 are starting to come back and may yield a little bit of fruit this year. "It takes two to three years to produce fruit again is what I've been told," he said. "But we need to get the grove to be manageable. We've done a lot of cleanup and the trees are much healthier."

Jeff, in fact, has been able to spend more time in the grove this past winter because he has now moved to the Fallbrook home on a fulltime basis. In Utah, he was a manager at a Costco and in the past year put in for a transfer to the Costco in nearby Lake Elsinore when a similar position opened up. "I got the transfer sooner than I expected to so I moved out here," he said, leaving his wife and daughter in Utah to finish out the school year.

Working 50 hour weeks at Costco and spending the rest of his spare time in the grove is keeping him a very busy man. "I don't have much time for anything else, but I am very intrigued by it."

He added that he loves working outdoors and back home in Utah, he spent a lot of time gardening so working the soil is something he enjoys. "I've learned a lot mostly from my grove manager."

Ultimately, Jeff and Kim want their 290 trees to turn a profit but for the time being, he understands he is going to take his lumps as he gets the grove manageable. "The first year (2012) we had a yield of about 25,000 pounds and we broke even. Last year (after stumping a significant portion of the grove) we got about 10,000 pounds and we lost about \$10,000."

As would be expected, Dillman's biggest expense is water.

He said the cost has been close to \$900 per month during the dry months, which is what he has mostly encountered this past year. Stumping more trees this winter, however, does have some advantage with regard to water use. "My grove manager tells me that with a stumped tree you can reduce the water by about 70 percent so that should result in some savings."

Talking to *From the Grove* in early February, Jeff said his on-tree crop was sizing fairly well and he was estimating picking about 20,000 pounds this year. The last two years, he has not size picked but rather stripped the grove in April. This year, he is still anticipating a late April harvest in an effort to capitalize on the Cinco de Mayo pull, but if the fruit is not large enough, he will probably wait a month. "I haven't figured out the picking thing yet. The last two years we have just gone with the grove manager's crew."

With an ultimate goal of managing his own grove completely, Dillman said he will have to learn the harvesting part as well as other aspects of growing avocados. But he's ready to learn.

"I went to a Good Agricultural Practices (GAP) meeting put on by the California Avocado Commission (CAC) recently and learned a lot." He added that other growers as well as the CAC staff were very helpful directing him to websites where he could get more information.

In one respect, Dillman is a fast learner. "Like the other growers I've met I am frustrated with the water situation and the price we have to pay for it."

He also has high expectations for his trees. "I expect to see 40,000 pounds per year when we get the grove where we want it. If we get that every year, we will make a profit." 🥑



CAC's 2012-13 Annual Report Goes Digital

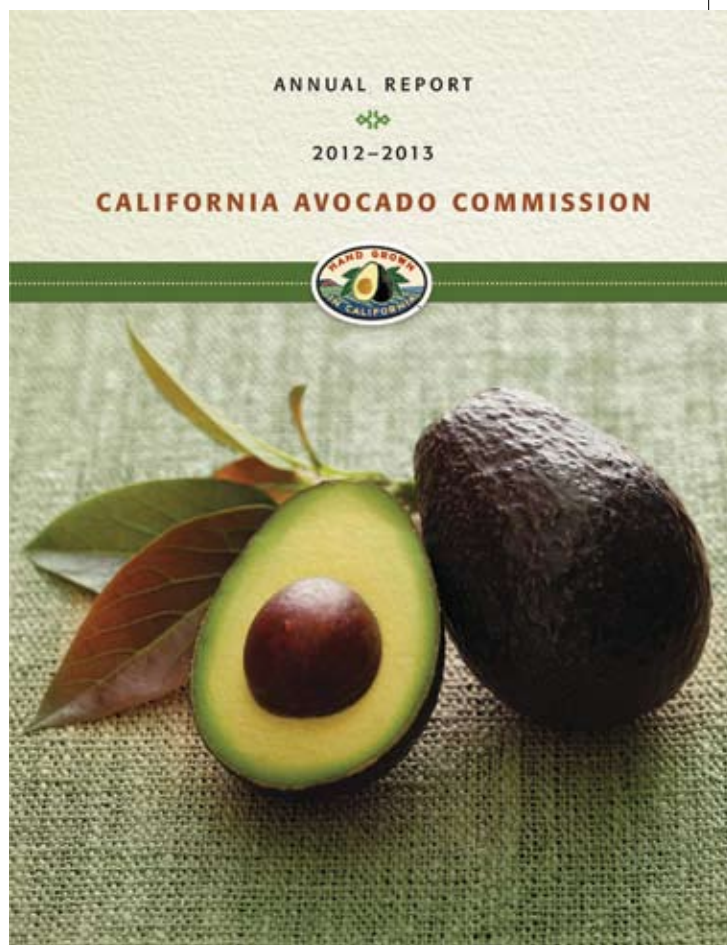
In an effort to maximize efficiencies, the California Avocado Commission is pleased to announce that the *2012-13 Annual Report* has been officially released as a 100 percent digital publication and is available on the California avocado grower website, www.CaliforniaAvocadoGrowers.com.

The CAC *2012-13 Annual Report* covers a wide array of Commission funded activities as well as industry statistics and financials. Below is just a highlight of what this year's report contains:

- The Commission's premium messaging, 4th of July and breakfast marketing campaigns
- Independent research studies tracking the successes and return on investment of CAC's integrated marketing programs
- The state of the avocado industry and future initiatives that will be built around developing consumer trends
- Developments in Industry Affairs, including the Santa Paula office, GAP/GHP, immigration reform and the Farm Bill
- Advances in CAC-funded Production Research, including progress at the Pine Tree Ranch Demonstration Grove, updates on pest and disease management initiatives, and industry outreach efforts
- 2012-13 Audited Financial Statements
- 10-year Industry Statistical Data

The *2012-13 Annual Report* can be viewed online as a digital flipbook or downloaded as a pdf at: www.californiaavocadogrowers.com/commission/accountability-reports/annual-report.

If you would like to receive a printed version, the Commission will print a copy in-house and mail it to you. A hard copy of the *2012-13 Annual Report* can be requested via email, phone, fax or regular mail or by returning the tear away postcard included in this article. 🥑



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By Ken Melban
Director, Issues Management

PSHB Outreach Moves Forward

As the concern over the distribution of polyphagous shot hole borer (PSHB) near avocado growing regions increases (see distribution map on page 32), the California Avocado Commission (CAC) partnered over the last few months with the California Association of Pest Control Advisers (CAPCA) to conduct pest control applicator (PCA) training on PSHB and fusarium dieback, the deadly fungus it vectors.

The first workshop was held at the Huntington Library in Pasadena where more than 60 PCAs were able to examine damage caused by PSHB infestation and resulting fusarium dieback. Workshops were also conducted in Ventura and Fallbrook with a combined attendance of 170 PCAs. All three workshops included training on the identification of PSHB and fusarium dieback signs and symptoms, along with a presentation on the biology and genetics of PSHB and a discussion on possible treatment tools. The presenters included University of California - Riverside researchers Dr. Akif Eskalen, Dr. Richard Stouthamer, and Dr. Tim Paine. All three are currently working on PSHB-related projects funded by CAC. A fourth workshop is scheduled for April 24, 2014, at the Rincon Beach Club in Carpinteria. (More information on that event can be found at capcaed.com.)

CAC President Tom Bellamore is also working with California Department of Food and Agriculture Secretary Karen Ross to develop a statewide PSHB task force for the coordination of state and federal agency activities and resources. CAC hopes to broaden the dialogue among regulators, environmentalists, commodity groups, and industries impacted by PSHB. Ideally, a high-level and focused discussion will lead to collective agreement on a coordinated strategy for further research, development of mitigation steps, and funding commitments where possible. Plans are underway for an initial meeting in Sacramento in spring.

Uniconazole (Sunny) Field Trials

Based on continued interest from growers, in late 2013 CAC initiated field efficacy trials on the plant growth regulator Uniconazole (Sunny), reported to temporarily stop vegetative shoot growth that could help maintain tree size, especially in high-density plantings. Prior to beginning the field trials, CAC staff met multiple times with representatives from Valent, the manufacturer, to discuss registration costs. Valent determined the studies necessary to support a registration with the Environmental Protection Agency (EPA) would be around \$2 million, and said they (Valent) would not contribute

financially to the registration due to limited economic return projections based on the relatively small sales market in avocados. Valent did indicate their interest in a Licensing Agreement that would allow CAC to recoup some of the up-front investment for registration requirements based on a percentage of sales should CAC pursue EPA registration. As the next step, the Commission decided to conduct field efficacy trials to determine whether Uniconazole would be a valuable tool for California growers. The field trials are expected to be completed this year at which time the Commission will determine if pursuing an EPA registration is merited.

Food Safety

From the early development of the CAC Food Safety program, the Good Agricultural Practices (GAP) Committee has focused on establishing a program that addressed potential areas of risk in growing and harvesting avocados, but remained committed to focusing only on areas that were a risk to avocados and not embracing a one-size-fits-all program developed from risk associated with row crops. The California avocado industry has made great progress over the last couple of years in this regard, with 35 percent of avocado acreage earning GAP certifica-

tion under the CAC-GAP program. The majority of certifications were completed through the USDA GAP audit process.

Since the beginning of the year there has been an increase in communications from major retailers regarding their specific food safety certification expectations. Specifically, retailers are increasingly moving toward a Global GAP standard. Global GAP is a more stringent set of requirements for growers, which typically involves much greater record keeping of both on-farm and vendor practices. In an effort to maintain a food safety program that truly mitigates risks associated with avocado production – without incorporating more arduous, unnecessary requirements for growers that ultimately don't improve the safety of the fruit – our industry has repeatedly maintained that the current GAP program is appropriate.

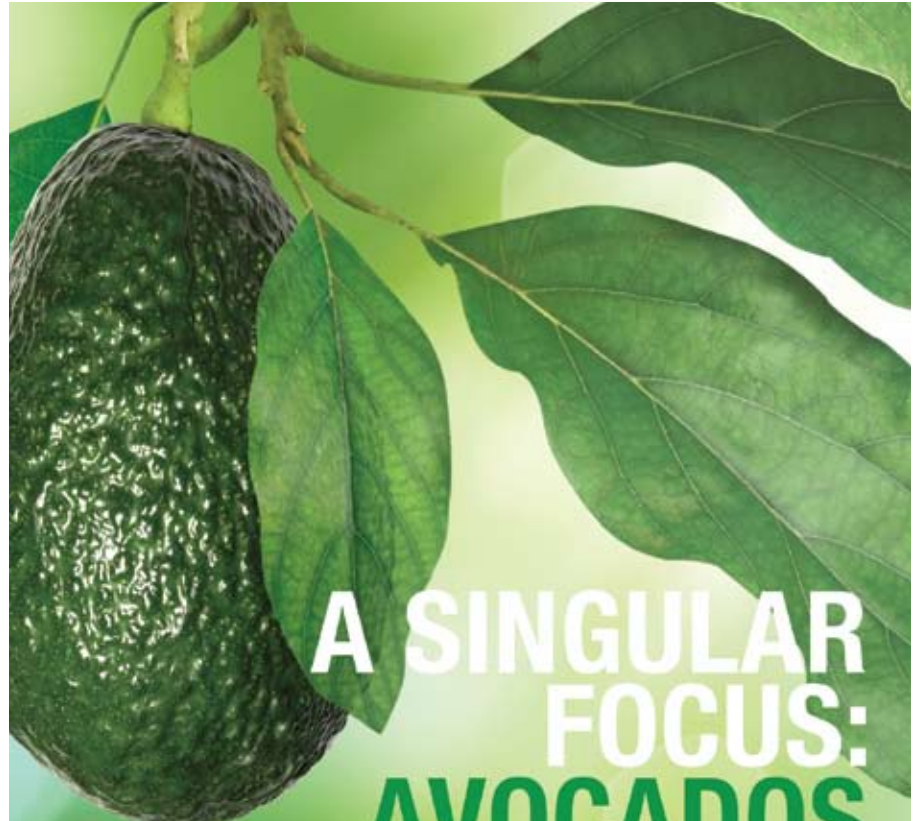
In addition to retail food safety demands, in January of 2011 the Food Safety Modernization Act (FSMA) was passed by Congress charging the Food and Drug Administration (FDA) with responsibility for protecting the nation's food supply. This government mandate states that growers must demonstrate compliance with set food safety standards. Recently, however, the FDA announced yet another delay in the deadline for the finalization and implementation of the Rule until August 2015 – making it more than four years since FSMA was signed into law.

So what does all this mean for you as a California avocado grower? Well, simply stated, it's not clear. On one hand, FSMA has been delayed, so growers still have time. Yet, on the other hand, with retailers and foodservice companies continuing to implement food safety certification requirements for their suppliers, and in some instances actually raising the bar, there's a good chance it will become increasingly difficult to find a

buyer for fruit that is not GAP certified. In addition, for growers who have gone through the USDA GAP certification, there is the possibility that more rigorous GAP certification will be required in the future.

CAC, along with the handlers, will continue to work on behalf of

the industry to ensure the food safety requirements for California avocado growers make sense for our industry. Unfortunately, though, as we all know from life's experiences, what makes sense and what ends up happening isn't always one and the same. 🥑



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Drought Emergency Brings Challenges to CAC Water Pricing Campaign

By Ken Melban
Director, Issues Management

As the current drought emergency in California becomes increasingly perilous, the California Avocado Commission's (CAC) ongoing effort to negotiate affordable agricultural water in the Metropolitan Water District (MWD) service area has become even more challenging. If you were to write a script of what elements you would want before approaching a water agency for a

reduced water cost for agriculture, a drought emergency would not be included. Rather, it would more aptly be considered part of a perfect storm (pun intended). Unfortunately, as is usually the case, we aren't able to write the perfect script, and so we find ourselves preparing to argue for affordable water for agricultural users in the midst of the worst drought California has faced in more than 100 years.

Adding to the difficulty surrounding CAC's efforts is the fact that MWD remains embroiled in a court case, making MWD reluctant participants in any cost discussion for fear of jeopardizing their position. Ultimately, with the situation for growers continuing to get worse and the "ideal" time for CAC to submit a formal agriculture water proposal to MWD becoming increasingly elusive, in spite of the above mentioned factors, the decision has been made to move forward. In February 2014, Charley Wolk, CAC Water Committee chair, provided comments at an MWD committee meeting notifying them that CAC would be presenting an initial proposal within the next few weeks.

For more than a year, the CAC team has been working with key MWD staff and board members to communicate the benefits Southern California agriculture provides as a reliable customer for MWD and to the community. University of California studies have also been initiated by CAC to determine the economic value generated by farming and agribusiness along with identifying environmental benefits. Last year CAC conducted a survey of MWD residential customers to determine their willingness to accept an increase in costs that would provide for affordable agricultural water. The results of the survey reveal that the vast majority of voters are willing to support affordable agricultural water rates for farms and other agricultural producers to support a regional goal of encouraging food production in and around Southern California. An initial assessment of support revealed that nearly three out of four residential customers (74 percent) support the program, 18 percent oppose it, and the remaining eight percent are undecided. The results were encouraging as nearly three-quarters of those

surveyed supported an increase of up to \$6 per year on their bills to help strengthen agriculture.

CAC has also been working to get community leaders, politicians and conservationists (just to name a few) involved in our water pricing effort, asking them to engage in a conversation on the importance of affordable water for agriculture. The value of locally grown produce is a common theme among many of our retail partners, and CAC has communicated how important it is for them to weigh in on this issue. CAC is also working to mobilize divergent interests and asking them to take a stand through newspaper commentaries, social media outreach and maybe even as spokespeople in front of media and decision makers.

In reality, though, for someone to move from a silent supporter to a vocal advocate they have to be significantly impacted. Unfortunately, in this situation, the most likely way for that to occur is if consumers, retailers, conservationists, environmentalists — the list goes on and on — are personally impacted by a major reduction in California-grown fresh produce and see the collateral consequences like lost jobs or disappearing open space. Obviously no one wants to see that happen, but apathy is always present, so CAC is working hard to ensure that outcome is avoided by sounding the alarm and asking that steps be taken now to strengthen Southern California agriculture for the future. With MWD in the middle of setting rates for both the 2015 and 2016 years, and no likely change in drought conditions in the near future, it now appears there's no time like the present. With a lot of hard work, and a little bit of luck, maybe, just maybe, history will show that the "ideal" time was now. 🥥



Behind the Scenes:

Introducing the CA Avocado Season to Retailers and Foodservice

Achieving targeted retail and foodservice customers' promotional support of California avocados in season is the top priority of the California Avocado Commission's (CAC) merchandising team. Though the promotional activities take place in season, CAC's team remains in contact with the accounts throughout the year. During the off-season CAC's retail and foodservice teams share avocado category sales and consumption data, consumer trend information and the competitive advantages of merchandising California avocados. As the season approaches CAC's marketing programs are presented, timing for transition to California avocados is discussed and commitments for promotions secured.



Greg Corrigan and Michael Schutt of Raley's in Northern California learn about California avocados from Jan Delyser and Dave Howald of CAC.



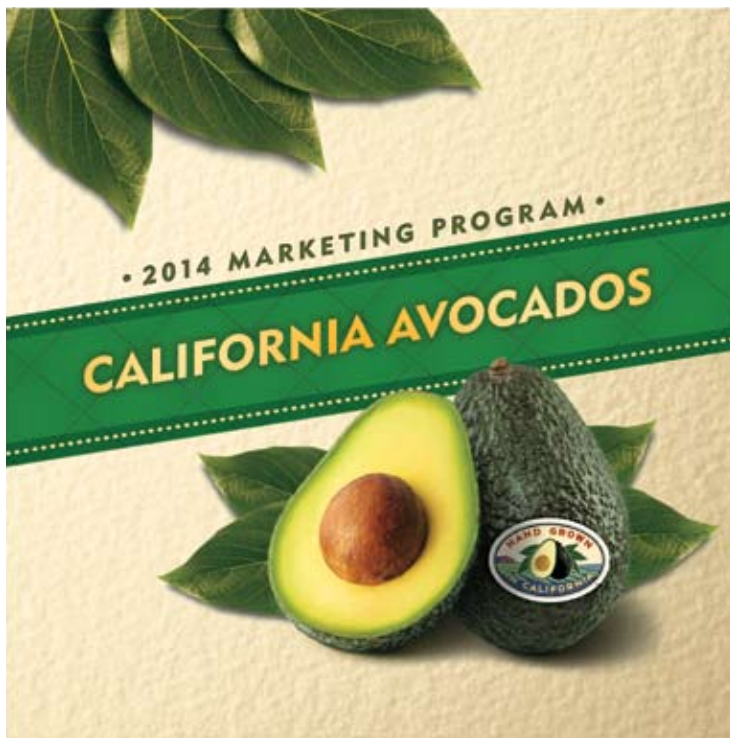
CAC RMD Connie Stukenberg and Dan Acevedo of West Pak Avocados at a pre-season Fresh Produce and Floral Council event

One of CAC's retail merchandising directors (RMDs), Connie Stukenberg, likens working with retailers and foodservice to farming: "You need to figure out what ideas to plant where, when to plant them, when to feed and water them, when to be content to wait, when and where it is best to prune, and when to harvest those ideas for the most fruitful yield."

This season the merchandisers are positioning Califor-

nia avocados as the premium choice with customers who prefer California avocados. Retailers who merchandise California avocados and support them with activities such as advertising, displays, digital media, special events and more will have the opportunity to earn prizes through CAC's new 5-Star Performance Program. Additionally there will be three key promotional thematics this year: American Summer Holidays with an emphasis on Fourth of July, California Fresh Snacking, and California Fresh Breakfasts. Independent research indicates that breakfast and snacks represent opportunities for increased consumption of avocados.

Because RMDs have limited time during their sales calls and may meet with a variety of people, including produce or perishables vice presidents, buyers, category managers and merchandising directors, organization of CAC's presentation material is critical. The RMDs begin planning for retail kick-off meetings by reviewing prior year promotion briefs and agreements, and compiling a promotional plan for each customer. One of the key tools used in the corporate retail kick-off sales meetings is CAC's Retail Marketing Book (aka the "ad kit") that showcases the premium nature of California avocados and details the benefits of merchandising California avocados during the season.



Cover of CAC's 2014 Retail Marketing Book

The Retail Marketing Book:

- Highlights research findings illustrating consumer preference for California avocados.
- Outlines the benefits of stocking California avocados in their produce section.
- Contains sell sheets with details of the 5 Star Performance Program and marketing support for the American Summer Holidays.
- Details the variety of in-store merchandising materials available for retailers, such as display bins and recipe booklets.

CAC's in-depth Avocado Business Reviews provide analysis of sales data for the RMDs' use in meetings with customers to review their avocado sales during the California season versus the off-season, as well as to compare prior year sales and their overall sales performance in the market place. This fact-based analysis provides the support for any recommendations the CAC team provides.

As for the foodservice channel, CAC strives throughout the year to build relationships with current and prospective chains by participation in conferences, conventions and hosting VIPs on Califor-

nia avocado grove tours. It can take several years of "pitching" the California avocado story before a foodservice chain opts to conduct a California-branded avocado promotion. To identify potential new chains for California avocado promotions, the CAC foodservice team evaluates which chains serve fresh avocados or will consider doing so, as well as the size of the chain and the volume of avocados used. For chains that have promoted California avocados in prior years, the team analyzes past promotions, including the volume of avocados moved per promotion dollar spent. This analysis helps the foodservice team prioritize target chains and create a strategic plan for each. Pre-season communication with customer culinary and marketing teams also helps influence avocado menu items, promotion themes and scheduling.

"CAC's merchandising and foodservice teams have been actively meeting with target accounts during the off season to wrap up last year's promotions and lay the foundation for the coming season. We work closely with the Marketing Advisory Committee and California handlers on the timing of our outreach and communication of our promotional plans," said Jan Delyser, CAC vice president of marketing. "Both retailers and foodservice operators anxiously anticipate the launch of the 2014 California avocado season." 🥑

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Standing room only at CAC's inaugural field day at Pine Tree Ranch in Santa Paula, Calif.

Inaugural Field Day Demonstrates Overwhelming Support and Interest in CAC's Outreach Efforts

By April Aymami
Operations Manager

By all conceivable standards, the California Avocado Commission's (CAC) January 23 inaugural field day at the Pine Tree Ranch Demonstration Grove in Santa Paula was a success. Consider this. It was standing-room-only for more than 100 industry stakeholders who participated in the learning session. Growers remained long after the conclusion of the event to network with fellow industry members. The presentations and in-grove demonstrations were informative and well received. And the presence of growers, stakeholders and members of Cal Poly Pomona were indicative of the widespread enthusiasm, interest and support for the Commission's outreach efforts.

Field Day Synopsis

The inaugural field day began with a welcome address from CAC President Tom Bellamore. During his opening remarks Bellamore noted that the Commission is committed to doing everything possible to keep the California avocado industry vibrant, progressive and prosperous for California avocado growers. "Pine Tree Ranch will give CAC an opportunity to test different planting and management techniques, and will add to the toolbox of vital information that we provide," said Bellamore.

Cal Poly Pomona Professor and Chair of Plant Sciences Valerie Mellano then reiterated the University's commit-



Dr. Carol Lovatt discusses differences in California avocado shoot growth

ment to partnering with CAC to provide industry outreach through the Pine Tree Ranch Demonstration Grove project. Following the welcoming addresses, two leaders in the

field of avocado research from the University of California, Riverside, gave presentations to the attendees. Dr. Carol Lovatt from the Botany and Plant Sciences Department discussed fertilizer strategies and how to make the best management decisions based on the previous year's crop load, current crop and bloom potential. Dr. Akif Eskalen from the Plant Pathology Department discussed orchard sanitation for disease control. If you missed the field day, copies of the presentation materials are available on the California avocado grower website, www.CaliforniaAvocadoGrowers.com.

Following the formal presentations, attendees took part in an in-grove pruning demonstration led by CAC's Research Project Manager Dr. Tim Spann and CAC Board members Doug O'Hara and Bradley Miles. During the in-grove portion of the field day, Drs. Eskalen and Lovatt were available for more in depth and intimate discussion with growers regarding pruning and fertilizer strategies.

Demonstration Grove Developments

Much has been accomplished at the Commission's Pine Tree Ranch Demonstration Grove since formally leasing the acreage in July 2013. Nine acres of lemon trees were



California avocado in-grove demonstrations reinforced the importance of sanitation while pruning



CAC Vice Chairman Doug O'Hara assisted in leading California avocado in-grove pruning demonstrations



removed and converted to mulch to make way for avocado plantings. And the development plan completed by the Pine Tree Ranch Demonstration Grove advisory group — consisting of Cal Poly representatives, California avocado growers and grove managers — is now in place. The plan calls for plantings of different densities, rootstocks and varieties to show California avocado growers how different options can affect tree growth, yield, fruit quality and grove management. (See *From the Grove*, Winter 2013 for complete plan details.)

In the next few months, several other key developments will take place. Land prep and irrigation installation in the currently undeveloped nine acres is underway, with completion expected early in the spring. Avocado trees slated for the undeveloped nine acres, as outlined in the development plan, have been ordered with the first shipments expected to arrive in late spring/early summer 2014. It is anticipated that the first of CAC's new trees will be in the ground within the next four months, allowing them time to get established and minimize their susceptibility to any possible frost next winter.

Upcoming Field Days

The Commission's demonstration grove is an integral part of CAC's production research program. "All CAC-funded research projects are now required to have an outreach component," said Dr. Spann. "Pine Tree Ranch is the ideal venue for demonstrating cultural management practices, testing rootstock and fruit varieties, and evaluating equipment that may be of interest to growers. This project is completely driven by grower need."

CAC will host two field day sessions at Pine Tree Ranch in the near future designed around the seasonal demands of California avocado groves. The first of these field days is scheduled for Thursday, March 27 at 10:00 a.m. and will focus on irrigation and pest monitoring. In late spring/early summer, CAC will host another field day that provides a hands-on demonstration regarding planting techniques for new avocado trees. Stay tuned to the grower website and *The Greensheet* for further details regarding these upcoming field days and seminar materials. 🥑

Dr. Akif Eskalen explains pruning best practices during California avocado in-grove demonstrations



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Introducing the CAC Blog

About 77 percent of Internet users read blogs and 31 percent of people say that blogs influence a purchase decision more than any other media or social channel. So this spring the California Avocado Commission (CAC) is launching a consumer-facing blog, “The Scoop,” to encourage demand and create interest and awareness around California avocados. Launched in March, the blog will be updated regularly with new avocado-centric information, recipes and credible, engaging content that builds loyalty and trust among California avocado consumers. The Scoop’s blog content will be constantly updated to meet the ever-changing interests of consumers, which also will help increase search engine visibility and website traffic.

The Scoop will be the hub of compelling content that resonates with California avocados’ target audience and brings the heart of the brand to life. The CAC team considered many factors, studies and data sources when developing the strategy for the blog, including keyword research (what words and phrases consumers use when conducting a Google search), the most popular content among CAC’s social media fans, top performing content on CaliforniaAvocado.com, blog trends and how the target consumer interacts with blogs. The blog has been integrated into the 2013-14 marketing plan and is designed to address the questions, wants and needs of avocado lovers, incorporate California lifestyle trends and ultimately help differentiate California avocados from the imports.

The CAC blog voice will be friendly and approachable, casual and informed – an easy, enjoyable read that is both entertaining, educational and consistent with the current

tone of social media. The blog will encourage readers to check the label for “California” and reiterate the importance of the California avocado season. Blog content themes and topics will include:

Culinary: Recipes will be one of the most popular topics because consumers are looking for new recipe ideas. The Scoop will highlight recipes from the CAC website, blogger partners, and other credible sources. Additionally, CAC will incorporate California avocados into timely food trends, feature artisan chefs, and provide cooking tips for home chefs of all experience levels.

Wellness and nutrition: Interestingly, “avocado nutrition” is the most searched phrase related to avocados. Blog posts will deliver nutritional information in engaging ways, explain how avocados fit into various diets, provide recommendations about breakfast and snacking from registered dietitians, and inspire an active lifestyle.

Blog Home Authors [Back to CaliforniaAvocado.com](#)

THE SCOOP

TIPS, RECIPES AND MORE FROM THE CALIFORNIA AVOCADO COMMISSION

RECIPES COOKING TIPS ENTERTAINING NUTRITION EVERYDAY LIFE IN THE GROVES

HOW MANY CALORIES ARE IN AN AVOCADO?

50 CALORIES
 11 g SATURATED FAT
 4 g TRANS FAT
 2.5 g POLYUNSATURATED FAT
 7 g MONOSATURATED FAT

HOW MANY CALORIES ARE IN AN AVOCADO?

Answer: This is one of the most common questions we receive from avocado lovers interested in avocado nutrition facts. Most people are surprised when they learn the calories in an avocado. One serving (2 tablespoons, 1 oz., or 1/8 of a medium avocado) has 50 calories. To get this in perspective, other foods commonly used as spreads: [Read More](#)

CALIFORNIA AVOCADOS BRING "GOOD" FATS TO YOUR TABLE

The assumption is that if you eat fat, of any type, it will make you fat. In my opinion, fats should have never been called fats in the first place -- they should... [Read More](#)

CALIFORNIA AVOCADOS - MY VERY SPECIAL, VERY VERSATILE KITCHEN STAPLE

For years I've embraced my salads with avocados and used them to make guacamole, but three recent events dramatically increased my family's avocado... [Read More](#)

2014 CALIFORNIA AVOCADO FESTIVALS - WHY YOU NEED TO EXPERIENCE ONE

Of all the annual California Festivals, the avocado festivals are our favorite of courses. We've even heard of folks flying in from other countries to express their... [Read More](#)

FEATURED RECIPES

CALIFORNIA AVOCADOS - MY VERY SPECIAL, VERY VERSATILE KITCHEN STAPLE

For years I've embraced my salads with avocados and used them to make guacamole, but three recent events dramatically... [Read More](#)

AVOCADO PISTACHIO ICE CREAM

Lovers please take an extra, consecutive sipping 68. Please!l consecutive ports from an afternoon restaurant eat... [Read More](#)

CALIFORNIA HASS FAMILY GUACAMOLE

California Guacamole made by Elizabeth Hays just the way Ruthless Hays, owner of the original Hass Avocado tree, loved... [Read More](#)

KICKED-UP CALIFORNIA AVOCADO MARGARITA

This avocado margarita may not be the first thing that springs to mind when you think of standard cocktails. But let it... [Read More](#)

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Growers and the growing process: The blog will reinforce the locally grown message through grower interviews and stories, and sharing growing practices, photos and fun facts.

Holidays and eating occasions: Blog content will align with CAC marketing plans around summer holidays like 4th of July and tie into sports events to inspire new eating occasions.

News, events: News and articles about California avocados, consumer stories and other campaigns also will be included.

While blog posts will be primarily text-based, they will include images or videos that capture the attention of readers and increase the likelihood that people will share the content with their friends. Most of the blog posts will be developed by CAC and its marketing agencies, but a number of third party spokespeople - blogger partners, registered dietitians, chefs, growers, America's Test Kitchen and more - will also contribute content.

While the blog will attract readers using Google searches or those browsing the California avocado consumer website, CAC will promote the platform across each marketing channel, including:

Social media: The blog will feed into CAC's social media platforms with posts promoted on Facebook, Twitter, Google+ and Pinterest, which have a combined audience of nearly 260,000.

Email: Select blog posts will be featured in email newsletters.

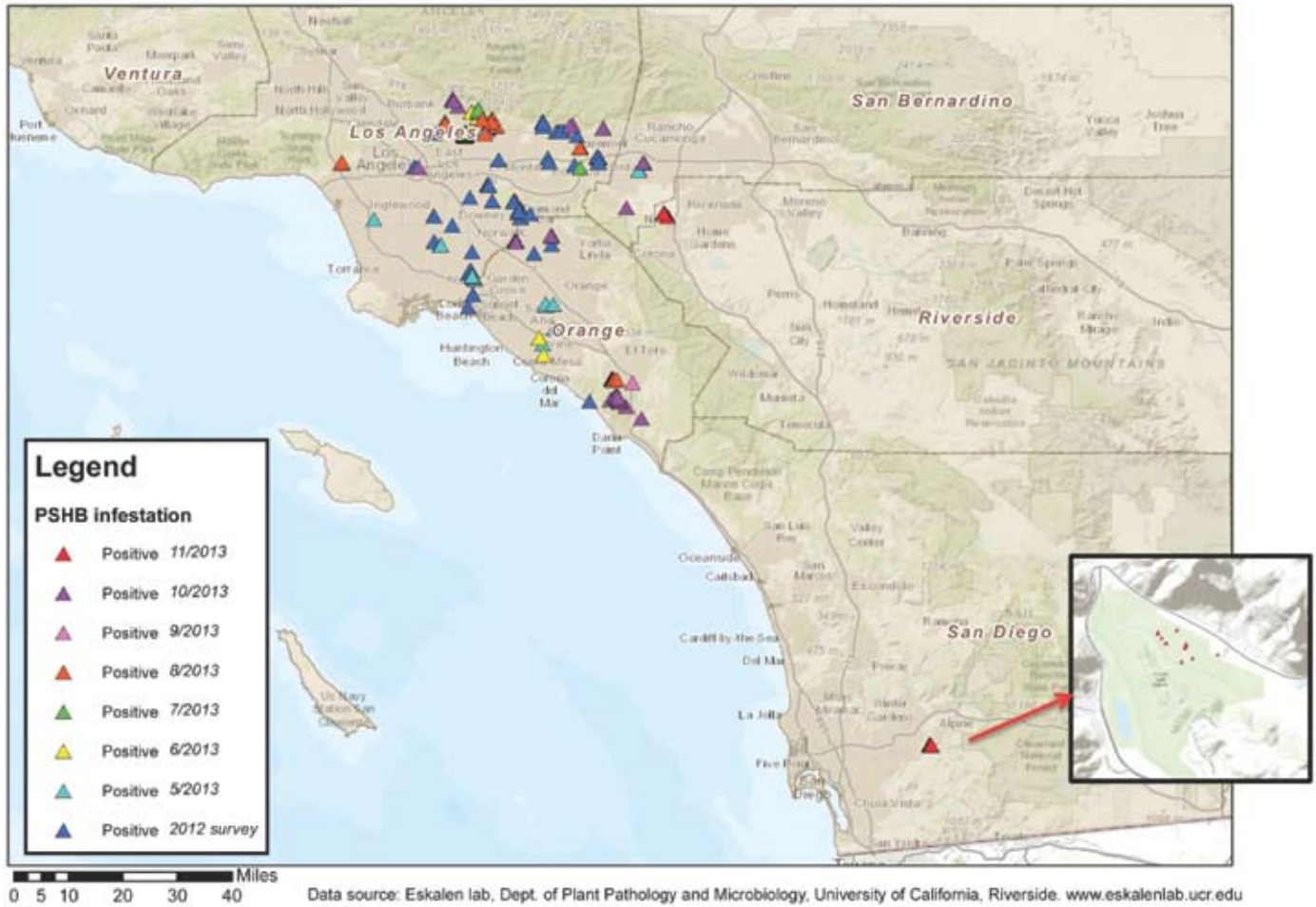
Online advertising: Social media advertising will extend the reach of the blog posts.

Public Relations: Blogger partners will cross-promote blog content and CAC will include the blog information in press releases.

Partnerships: CAC will leverage third party partnerships with other food brands to cross promote blog content.

Once the blog launches in mid-March, the Commission will closely monitor results to determine what content best resonates with readers. CAC will closely monitor blog post views (how many people are reading the blog and which articles they read most often), as well as the reach of the content (where the content is shared and how often it is viewed) and brand mentions over time. CAC encourages all of our *From the Grove* readers to follow The Scoop and share interesting posts with friends.

If you have an interesting story to share, please contact Online Marketing Manager Zac Benedict at (949) 341-1955. You can follow the blog at [CaliforniaAvocado.com/blog](#).



Beetle Found in Commercial Avocado Grove

By **Tim Spann**
Research Project Manager

On February 11, 2014, a dead ‘Hass’ tree on Mexican seedling rootstock was found in a commercial avocado grove in south Orange County. Initially, it was thought that the tree had succumbed to salinity and/or drought stress; however, on closer inspection a significant amount of sugar exudate was found on the trunk of the tree. Once this sugar exudate was scraped away, the telltale holes of the polyphagous shot hole borer (PSHB) beetle were found. As of this writing, samples taken from the tree are being analyzed by Dr. Akif Eskalen’s lab at UCR to confirm the presence of the *Fusarium* pathogen. No signs of attack were found on any other surrounding avocado trees; however, the area had just received some rain that

may have washed away the sugar exudate making detection difficult.

It was very surprising that this tree was completely dead upon discovery. From what has been observed on avocado trees at the Huntington Gardens and elsewhere, avocado appeared to tolerate this pest for quite some time (at least two years), showing only branch dieback symptoms, before succumbing. This was a relatively small tree (about eight feet), was suffering from salinity stress, and, no doubt, was under some drought stress given our current dry conditions. All of these factors may have combined and led to the quick death of this tree.

Growers are advised to be extra vigilant, particularly those

who have groves near known areas of infestation. The tree that was found was just a few rows into the grove, which is adjacent to a park with a riparian forest that includes very good PSHB hosts, including willows and sycamore, which likely served as the source of the infestation. If you see any suspect symptoms you are encouraged to contact your county farm advisor or Dr. Akif Eskalen's lab at 951-827-3499, akif.eskalen@ucr.edu.

PSHB in San Diego County

As the last issue of *From the Grove* went to press, we learned that PSHB had been found in El Cajon in San Diego County. The find was on sycamore trees at the Sycuan Golf and Tennis Resort. Surveying efforts to fully delimit the extent of this infestation are still ongoing, but it does not appear to have reached nearby commercial avocado groves.

Initially, it was thought that the San Diego infestation was the result of infested plant material being moved from L.A. and Orange Counties. However, genetic analysis of the beetles in San Diego County shows this is not the case. Much the same way that DNA analysis can be used to determine where a person's ancestors were from, the same can be done with PSHB. Dr. Richard Stouthamer, an entomology professor at UCR, believes that PSHB likely originated in Vietnam and spread throughout Asia, with distinct populations found in Thailand, Taiwan, Japan and elsewhere. His work shows that the beetles in L.A. and Orange Counties match those in Vietnam and the beetles in San Diego County match those in Taiwan. This means that there have been at least two introductions of this beetle into California, one from Vietnam and one from Taiwan.

PSHB in Santa Cruz County

On November 4, 2013 inspectors with the California Department of Food and Agriculture's Plant Health and Pest Prevention Services department found a small beetle while

checking a funnel trap in the city of San Lorenzo Valley in Santa Cruz County. The beetle was submitted for identification and was confirmed as a polyphagous shot hole borer specimen on February 24, 2014. The trap, part of a network

of traps distributed throughout the state to monitor for pests, was in a bay laurel tree. However, since the beetle was collected from the trap it is not clear whether the bay laurel tree was the host. Survey crews will be visiting the area to inspect known PSHB host species near the capture site to determine if there is an established population in the area and, if so, how it got to northern California.

Searching for Predators in Vietnam

As of this writing, Drs. Stouthamer and Eskalen are in Vietnam working with colleagues there to try to find natural predators of the PSHB. They have been visiting acacia and cinnamon plantations, both known PSHB hosts. Acacia, a non-native timber species is hit very hard in some locations, and the farmers report that the infestation seems to have gotten worse over the past couple of years. In cinnamon, a native species, PSHB is a minor pest. They have also found a beetle attacking tea plants in a tea plantation; however, until genetic tests are complete they are unsure if this beetle is PSHB or the physically identical tea shot hole borer. With regard to natural enemies, their cooperator in Vietnam finds a lot of flies and fly larvae associated with the beetle. However, they need to determine what fly species they are and whether they are feeding on the PSHB, the fungi, or are simply found together but do not interact.

For the latest updates about PSHB and to see the current distribution map, please visit the Eskalen Lab's website, <http://eskalenlab.ucr.edu/avocado.html>. 🥑



The trunk of the infested avocado tree in a south Orange County grove showing sugar exudate and several PSHB bore holes with dark staining caused by the fungal infection.



A close-up of a PSHB bore hole (center) surrounded by dark staining caused by fungal infection on the trunk of the infested avocado tree in a south Orange County grove.



Tracking the fate of individual avocado flowers following hand pollination (inset). Photos from Iñaki Hormaza.

Factors Influencing Avocado Fruit Set and Yield

(Editor's Note: This article is a summary of a talk given on January 13, 2014, in Fallbrook by Dr. Iñaki Hormaza, Professor at the Institute for Mediterranean and Subtropical Horticulture in Malaga, Spain.)

As for every tree crop, the factors that lead to successful fruit set and yield of avocados are many and complex. In avocado, the setup for yield begins almost two years before harvest with the growth of a summer flush shoot. The buds on that shoot then undergo floral induction in late summer to early fall. During winter, floral initiation occurs, and the flowers open during bloom the following spring. Once the flowers open, there must be pollen transfer from anthers to stigmas, pollen germination and pollen tube growth, and finally fertilization of the ovule. If conditions are right and resources – water, light, temperature, nutrients – are available in the correct amounts, a year later an avocado can be harvested.

Avocados are characterized as having low fruit set, meaning that most of the flowers never set fruit. In many species, this can result from inadequate pollination, and this holds true for avocado where studies have found that under natural conditions fruit set is just 0.15 percent. That means that

for about every 700 flowers produced only one fruit is set.

To test if low fruit set is the result of inadequate natural pollination, hand pollination studies were conducted. Hand pollination increased fruit set to 2.8 percent (or about 3 fruit for every 100 flowers), an improvement but still low.

Interestingly, there is no difference in the percent fruit set between on and off years; differences in yield are due to the differences in the total number of flowers produced. Collectively, these findings suggest that inadequate pollination does play a role in avocado's low fruit set, but other factors must also be involved.

Flower Types

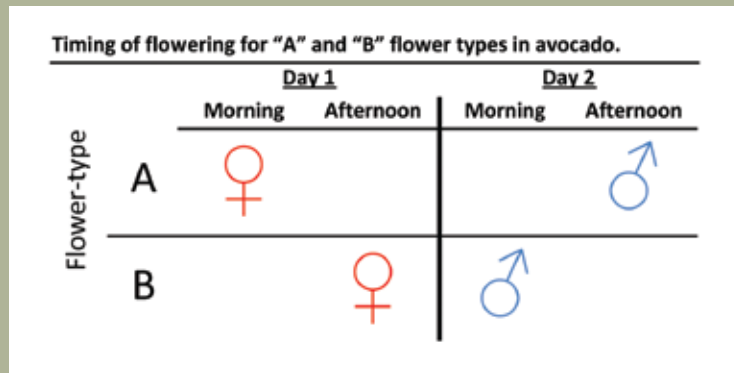
One factor that influences inadequate pollination in avocado is the tree's unusual flowering habit. Avocado flowers open twice, once in the female stage and once in the male stage. When they open during each stage determines whether they are classified as "A" or "B" flowering type. Cultivars with "A" flowering behavior (e.g. Hass) open in the female stage the morning of day one and in the male stage the afternoon of day two. Cultivars with "B" flowering behavior (e.g. Fuerte) open in the female stage the afternoon of day one and in the male stage the morning of day two. Evolutionarily, this flowering pattern favors cross pollination since a female "A" flower overlaps with a male "B" flower and vice versa.

Pollen Viability

Assuming adequate overlap exists among flower types in an orchard, the pollen that gets transferred from one flower to another must be viable. Some species have inherently low pollen viability. Under conditions in southern Spain, germination tests indicate that avocado pollen has a viability of about 50 percent to 60 percent. Anecdotal evidence suggests that viability may be higher under California conditions. However, it is not surprising that a species like avocado — which is native to cool, moist climates — has reduced pollen viability in warm, dry climates like California and southern Spain. When stored at 39°F, pollen viability is measurably reduced after as little as one day. However, when flowers were pollinated with fresh or stored (one-day-old) pollen there was no measurable reduction in final fruit set. This suggests that pollen viability may not be a major factor in avocado's low fruit set.

Flower Quality

An interesting question is whether all flowers in an inflorescence are created equal. Physical examination of individual flowers from within an inflorescence revealed no external differences among flowers. However, when flowers were analyzed for starch content, up to ten-fold variation was found among flowers within the same inflorescence. And starch content was strongly correlated with fruit set, with flowers that set fruit having three times higher starch content, on average, compared with flowers that dropped. Differences in flower starch content were not associated with position of the flower in the inflorescence, whether the inflorescence was determinate or indeterminate, or wheth-



er it was an on or off year. How to increase flower starch content and whether this can improve fruit set is a focus of ongoing research.

Pollination

Pollination, the act of moving pollen from the anther (male part) of a flower to the stigma (female part), in avocados requires pollinators (something, usually an animal or insect, that physically moves the pollen). As mentioned earlier, poor pollination is among the factors that contribute to poor fruit set in avocado. One reason for this is that honeybees, which are native to Europe, did not evolve with avocados and are not well-adapted to pollinating this species. In its native range, avocados are pollinated by several different stingless bee species and at least one species of wasp. Bumble bees or other insects may be more efficient pollinators under commercial production conditions and the prevailing weather conditions during bloom, but they are not as easily established in orchards as honeybees.

Pollination and flowering type also have a strong interaction that affects fruit set. When flowers were tracked from pollination through fruit set, it was found that the flowers whose stigmas had the fewest pollen grains were more likely to drop and those with the most pollen grains (> 40) were the most likely to set fruit. In order for the most pollen possible to be transferred among flowers there needs to be sufficient overlap of male and female stages on a given day and overlap across the bloom period.

The source of pollen may also be important to successful fruit set. In a hand pollination study, Hass flowers were pollinated with pollen from Nobel, Marvel or Fuerte. Flowers that were pollinated with Nobel and Marvel pollen had 8.4 percent and 7.4 percent fruit set, respectively, whereas those pollinated with Fuerte had only 2.8 percent fruit set.

However, the necessity of pollinizers is not that clear cut. In an experiment where a solid Hass block was adjacent to a solid Fuerte block, cross pollination between the two cultivars was examined by DNA analysis on the seeds of Hass fruit. In the first row of trees adjacent to the Fuerte block, 40 percent to 50 percent of the fruit resulted from cross pollination; in the second row of trees about 30 percent to 40 percent of the fruit resulted from cross pollination; and



Female (top) and male (bottom) avocado flowers. Photos from Iñaki Hormaza.



in the third row only 20 percent to 30 percent of the fruit resulted from cross pollination. And over a 13-year-period there was no significant effect of dis-

tance to pollen source on yield, except in two off years when the closest row of Hass trees to the Fuerte block had higher yield.

Environmental Factors

Temperature and relative humidity are important factors that strongly influence flowering and fruit set. In general, cooler temperatures result in a more protracted bloom and vice versa. But temperature is also important to the daily cycle of flower opening and closing and pollen viability. Maximum pollen adhesion to the stigma occurs from 68 to 77°F, and pollen germination also peaks in this temperature range. Once the pollen grains germinate, temperature affects how fast the pollen tube grows to the ovary allowing for fertilization. From 68 to 86°F, pollen tubes reached the ovary in approximately 8 to 12 hours; however, at 50°F it can take up to 48 hours.

In order for pollen grains to adhere to the stigma, the stigma must be moist. Maximum pollen adhesion and germination was found to occur at 75 percent relative humidity, which suggests that the dry climate of California and southern Spain adversely affects pollen adhesion and germination. It is unknown whether irrigation or canopy water sprays could increase relative humidity enough to positively affect stigmatic receptivity and pollen germination.

Fruit set and yield in avocado is a result of the interaction of numerous complex factors. In a commercial production system we would ideally manipulate these factors to maximize yield, but many of them are out of our control (e.g., temperature, humidity) or we simply don't have enough knowledge to control them (e.g., flower starch content). Therefore, we need to make the best choices possible by carefully selecting pollinizers based on overlap of sexual stages and bloom period; encourage pollinator activity in the orchard; and manage fertilization, irrigation and pruning to develop good summer flush to maximize flowering potential. 🥑

By Tim Linden

Spain Steadily Growing Volume As It Gains Access to U.S. Market

Spain's avocado production, which dates back about 60 years, reached its modern peak in 1997 with a total output of about 60,000 tons. Production did decline after that, though now it appears to be on the rise again. And in early January, the U.S. Department of Agriculture (USDA) announced that fruit from mainland Spain that has been certified free of all quarantine pests is allowed to be shipped to the United States.

However, don't expect an onslaught of shipments as the USDA announced that about 260 tons (520,000 pounds) of Spanish avocados may come into the United States this year.

Enrique Coliles, general manager of TROPS, a 1500 member grower association involved in mangos and avocados, recently shared information about Spain's avocado industry with *From the Grove*. TROPS, which handles about 30 percent of Spain's avocado production, is located in Velez-Malaga, a city in the south of Spain in the province of Malaga in the Andalusian region of Spain. Perhaps Granada is the most famous city in that region. Almost 90 percent of Spain's avocado production comes from that region, which stretches from Portugal to the east through the Straits of Gibraltar and encompasses almost all of the southern coastal region of Spain that touches the Mediterranean.

Coliles said that in the 1990s about 30 percent of Spain's crop was made up of green skin varieties,



while 70 percent was Hass. Over the last 15 years, Spanish growers have been pulling out their green skin acreage and he said the Hass variety now makes up about 87 percent of total production.

He reported that annual Hass production is typically between 35,000 and 50,000 tons. A grower organization in Malaga has estimated this year's crop at 40,000 tons. Coliles said the European Union is the top market for Spanish avocados as those countries take about half of Spain's production.

Coliles pegged Europe's avocado consumption at about 700 grams per year, which equals about a pound and a half per person. "Surprisingly," he said, "Spain, the only avocado grower in EU, only consumes 500 grams per habitant."

He added that the "companies in Spain are developing themselves as service suppliers, importing fruit for

other countries, mainly from South America, and selling it in the rest of the EU, giving it added value with the packaging and ripening services." TROPS has an import company as well as an avocado processing facility where it makes guacamole for resale.

With regard to Spain's production, this TROPS executive noted that Spain only produces Hass avocados from the end of November to May. Coliles said green skin varieties are available as early as September but he said market demand for those varieties is lacking and growers must settle for a price that they believe is too low. "I'm not going to say that the growers are happy with the current market price of the green skin. Really not, but we are trying to convince them that the markets demand is only for Hass."


Just as in California, Coliles said water is the biggest problem facing growers. He said there is much

land with good climatic conditions to produce avocados but it is lacking irrigation infrastructure, which is an impediment for growth. On the other hand, Coliles said Spain's well-publicized economic problems are forcing some people out of other business sectors and they are exploring agriculture as an option. As a result there are

significant investments being made in establishing irrigation on much new land. He estimated that avocado production could increase as much as 30 percent in coming years.

"It's not cheap to produce avocados in Spain," he said. "The land is expensive, but it is a good business in comparison with the rest of the agri-

culture sectors in this area."

It is estimated that less than 10,000 tons of avocados are purchased through domestic marketing channels in Spain. Coliles said the most popular way to eat avocados is as part of a salad but added that guacamole is gaining favor. 

Handlers Report

By Tim Linden

Record Numbers Could be on the Horizon

Just what both the field price and market f.o.b. will hit this year for California avocados, is anybody's guess. But record numbers are not out of the question.

"It looks a lot like 2011," said Ron Araiza, director of sales for Mission Produce Inc., Oxnard, CA. "The (f.o.b.) price got in the \$50-\$54 range that year and I think that could happen this year."

He said in his memory, the highest market price he has ever seen was north of \$60 per carton. He would not predict that this year, but indicated that it would not be a complete surprise if it happened.

Jim Shanley of Shanley Farms, Morro Bay, CA does expect to see record grove prices paid at some point this year. "The highest I have ever seen is \$2.20 (per pound at the grove) and I think at some point, we'll top that."

The bullish viewpoints are simple arithmetic, according to Shanley. California has a short crop this year with many believing it will not reach 300 million pounds. At the same time both Shanley and Araiza have heard


that Mexico will not be shipping record numbers to the United States as the summer drags on, both because of supplies and global demand. "For the first time in at least a decade there has not been a big increase in certified hectares (for export to the U.S.)," said Ariaza.

Shanley said with U.S. consumption at an average of close to 35 million pounds per week, there just won't be enough avocados to fill that demand as the California season moves along. The situation may be especially acute toward the late summer when San Luis Obispo typically markets much of its output. He wonders out loud just how much consumers will pay for an avocado. "Is it \$2.99, \$3.99, \$4.99?"

Mission has been packing California fruit since January and Araiza expects the California season to end by about mid-September. Typically San Luis Obispo has fruit well into October with some select customers getting the "Morro Bay" branded fruit in November. The Mission executive said lack of water has caused some of those most northern grow-

ers to pick early so he just doesn't expect fruit from that region to be around as late this year.

Shanley confirmed that in general San Luis Obispo does have severe water issues but on this day (Feb. 27), he said three quarters of an inch of rain fell and four more were expected in the next few days, which has moved the situation from "apocalyptic to grim. And using the word apocalyptic was not too strong."

Shanley said some groves have no water and those growers have been picking their fruit early. On the other hand, he said there are 6,000-7,000 acres of avocado trees in San Luis Obispo County and some growers do not have water problems. He is currently talking to some of his growers about holding their fruit late in the season so they can service the customers they have created for the Morro Bay brand. Shanley said the recent rain greatly helped in that cause. However, he admits that if a grower has an opportunity at a \$2 per pound in the grove price in the middle of the summer, he will be hard pressed to pass that up. 

TOGETHER WE GROW

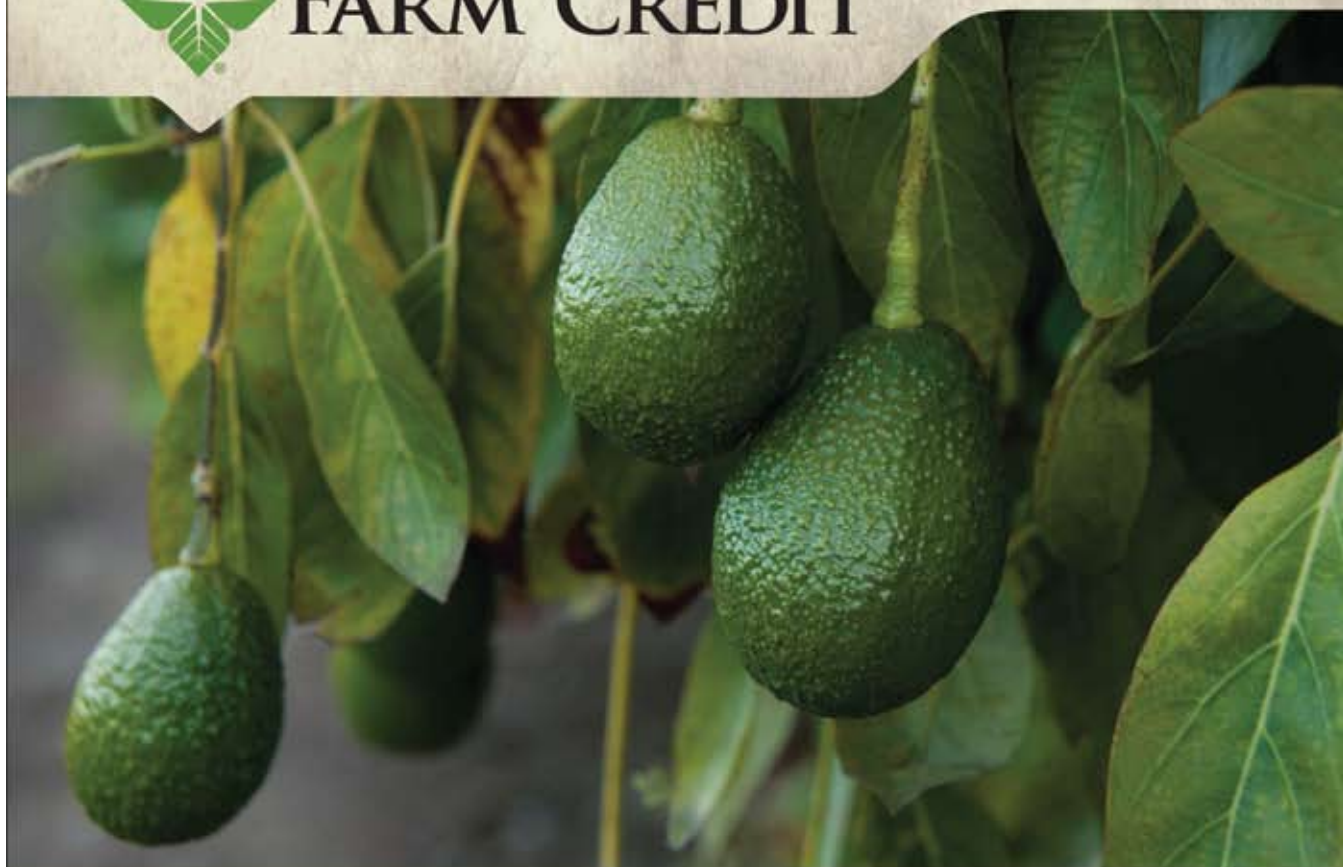
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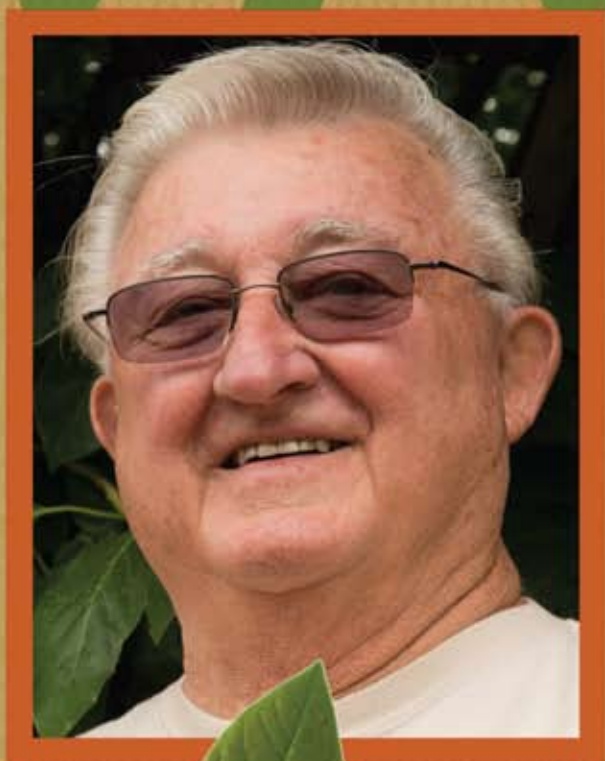


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JOE SPYCHAJ
Avocado Grower

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