

# FIRST PRESS

## NEWSLETTER OF OLIVE OIL PRODUCTION AND EVALUATION

Volume 2, Number 1

Fall 2006

### Olive Oil Yield Factors Affecting Production

The amount of oil a producer gets from an acre depends primarily on the tonnage yield of fruit per acre, which varies by year, fruit set, irrigation, pruning, age of trees, etc. This seems straightforward, but it must be noted that oil yield and fruit yield do not necessarily increase at the same rate. This is because olive trees have the ability to produce more oil with an increased leaf-to-fruit ratio; this higher oil content in the fruit that is produced during a lower yield year partially makes up for lower fruit tonnage. The amount of oil that a producer gets from a given amount of fruit depends on many factors:

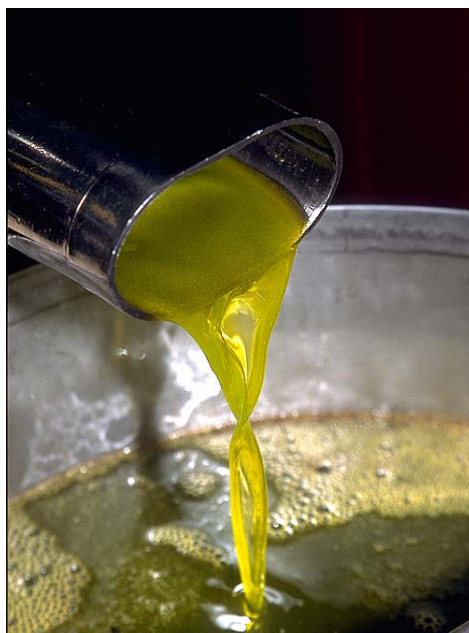
**Oil content of the fruit**—varies by year, the amount of fruit on the tree and variety

**Extractability of the oil from the fruit**—varies by year, water content, fruit maturity and variety

**Extraction process**—varies by paste fineness, malaxation time and temperature, decanter efficiency, or the amount of time and pressure used on the press cake.

#### Yield of olives per acre

Yields per acre can range from less than one to as high as 9 tons per acre (2-20 metric tons per hectare); a good consistent yield from year to year would be about 4 tons per acre (9 metric tons per hectare). Low yields usually can be related back to a lack of



shoot growth the previous year from poor tree vigor. This can be caused by inadequate irrigation or dry farming, poor weed control, disease, very low fertility, or inappropriate pruning. Low yields can also be caused by poor weather conditions during bloom, lack of chilling, frost damage, inadequate flower pollination or simply a heavy crop the year before. Olives are strongly alternate bearing because a low crop yield one year will likely promote more shoot growth, resulting in more flowers and higher yields the following year. High yields are produced consistently only from orchards that are very well managed (Table 1).

An orchard that yields twice the fruit that it did last year does not necessarily yield twice the amount of oil. Normally a doubling of fruit yield will only increase the total oil yield by about 75%.

(Oil Yield, cont. on p.2)

### Olive Fly Product Update

The long-awaited change in the status of Dow's GF-120 has occurred; the registration now covers all crops. This means that the product is no longer under a Sec. 18 for olives, and a permit is no longer required.

Non-commercial growers will be able to purchase the product under the new registration and apply it without obtaining an applicator's certificate.

If you have any product with the old label left from last season, *you must obtain a copy of the new label in order to use the product under the new registration.* A label can be downloaded from the following: <http://www.cdms.net/ldat/ld67P008.pdf>.

The attract and kill device, called Magnet OL in this country, has generated a lot of interest. It is a very convenient method, similar to a trap, that is placed in the trees at the beginning of the season and removed when the season is over. It was supposed to be widely available during 2006 but that never happened.

The reason for the delay is the acquisition of Agrisense by Suterra; they will now distribute Magnet OL. Check their website for current info: [www.suterra.com](http://www.suterra.com).

For questions about the new GF-120 registration, or pesticide regulatory issues in general, call your local agricultural commissioner's office. For descriptions of various olive fly control options, go to [http://cesonoma.ucdavis.edu/Horticulture/Horticulture\\_Publications.htm](http://cesonoma.ucdavis.edu/Horticulture/Horticulture_Publications.htm), scroll down to Olive Pests, and click on *Olive Fly Handout for Growers*.

One last note: it's October and the olive fly catches are way up in our research trees here in Sonoma County. Harvest may be just around the corner, but don't let up on your olive fly control program just yet!

—Alexandra Devarenne 

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Table 1. Orchard Yield Projections for Oil Olives

Fruit Yield	Factors Affecting Yield
1 TON PER ACRE 2.24 METRIC TONS/ HA	<ul style="list-style-type: none"> <li>• Widely-spaced orchard in the 5<sup>th</sup> – 6<sup>th</sup> year; older orchard with close spacing shading out the lower parts of the trees.</li> <li>• Poor irrigation, weed control, pruning and nutrient management.</li> <li>• Excessively vigorous or weak growing conditions.</li> <li>• Poor pollination conditions from rain, cold, drought stress, or hot-dry wind during bloom, or inadequate pollinizer trees.</li> <li>• Alternate "off" year of production.</li> <li>• Super-high-density orchard in the 2nd year.</li> </ul>
2 TONS PER ACRE 2.48 METRIC TONS/ HA	<ul style="list-style-type: none"> <li>• Widely spaced orchard in the 6<sup>th</sup> – 8<sup>th</sup> year or poor irrigation, weed control, pruning and nutrient management.</li> <li>• Excessive shading. Alternate "off" year of production from very heavy production last year.</li> <li>• Excessively vigorous or weak growing conditions.</li> <li>• Poor pollination conditions from rain, cold, drought stress, or hot-dry wind during bloom, or inadequate pollinizer trees.</li> <li>• Super-high-density orchard in the 3rd year.</li> </ul>
3 TONS PER ACRE 6.73 METRIC TONS/ HA	<ul style="list-style-type: none"> <li>• Properly spaced orchard in the 9<sup>th</sup> – 10<sup>th</sup> year with good irrigation, weed control, pruning and nutrient management.</li> <li>• Probable maximum yield from a coastal hillside orchard.</li> <li>• Some shading problems. Some poor weather during bloom or a lack of pollinizer trees.</li> <li>• Super-high-density orchard in the 3rd year.</li> </ul>
4 TONS PER ACRE 8.97 METRIC TONS/ HA	<ul style="list-style-type: none"> <li>• Properly spaced orchard in the 10<sup>th</sup> year + with good irrigation, weed control, pruning and nutrient management.</li> <li>• A great sustainable yield if everything is done right and nature cooperates.</li> <li>• Trees have the correct vigor and growing conditions.</li> <li>• Well managed super-high-density orchard in the 4th + years.</li> </ul>
5 TONS PER ACRE 11.21 METRIC TONS/ HA	<ul style="list-style-type: none"> <li>• Properly spaced orchard in the 10<sup>th</sup> year + with excellent irrigation, weed control, pruning and nutrient management.</li> <li>• An excellent yield especially if it can be sustained each year.</li> <li>• Alternate "on" year of production from a low yield last year.</li> <li>• Perfect growing conditions and doing everything right.</li> <li>• Very well managed super-high-density orchard in the 4th + years.</li> </ul>
> 6 TONS PER ACRE* > 13.45 METRIC TONS/ HA	<ul style="list-style-type: none"> <li>• Properly spaced orchard in the 10<sup>th</sup> year + with excellent irrigation, weed control, pruning and nutrient management.</li> <li>• Yield that probably cannot be sustained each year.</li> <li>• Alternate "on" year of production from a very low yield last year.</li> <li>• Perfect growing conditions and doing everything right.</li> <li>• Excellent management in a super-high-density orchard in the 4th + years.</li> </ul>

\* Yields have been recorded in table olives in California at 12 tons per acre (26.9 metric tons per hectare). This is usually preceded by a light crop and followed by a very light crop.

FIRST PRESS is produced by  
University of California  
Cooperative Extension  
133 Aviation Blvd, Suite 109  
Santa Rosa, CA 95403  
707-565-2621  
www.cesonoma.ucdavis.edu  
Paul Vossen, Farm Advisor  
Alexandra Kicenik Devarenne, Staff Research Assoc. (Editing, Design & Layout)

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#### (Oil Yield, cont. from p.1)



Thick, dry paste, from Frantoio olives, that does not emulsify and separates easily. Note clean paddles due to coating of free oil.

#### Yield of oil per ton

The quantity of oil in the fruit is a built-in genetic factor, but it can vary from year to year due to tree vigor, crop load, fruit maturity, and fruit moisture content. Oil content varies by variety from less than 10% to about 30% on a wet weight basis. Since oil accumulation peaks when the fruit is quite mature, delaying harvest until the fruit is ripe



Over-watered, very ripe Manzanillo paste that forms an emulsion between oil and water, increasing oil loss in pomace or wastewater. Note paste sticking to paddles.

assures the highest yield of oil, though it will change some flavor characteristics, and extractability if the weather is rainy.

The extractability of the oil from the fruit is heavily influenced by fruit moisture content, maturity, and many specifics of the extraction process such as paste fineness, (cont. on p.3)



## Progress on the USDA Standards for Olive Oil

Dick Nielsen, COOC Board Member, and I recently met with several representatives of the US Dept of Agriculture (USDA) Processed Products Branch in Stockton. This meeting brought together USDA staff from Washington DC and elsewhere with experience enforcing standards for various commodities. It was part of two days of discussion on the proposed olive oil standards that included the COOC taste panel leaders talking about sensory evaluation on day one.

Having been involved ever since the COOC proposal was made to adopt the International Olive Council (IOC) olive oil standards in the US, I had an opportunity to review the proposed standards before they are made available for public comment. (Any proposed government laws such as this must be made available for public comment for 60 days prior to final approval.) The proposed USDA standard is essentially a duplicate of the IOC standards, with all the same lab analysis requirements including the sensory rating. It would be enforced by the USDA. It has been proposed to give each grade of olive oil the prefix "USDA" in the name (i.e. "USDA Extra Virgin"). The laboratory tests can be conducted now quite easily at several available labs including the USDA's own lab.

There is uncertainty over just how to handle the sensory portion of the standard. Sensory analysis is complicated, expensive, and requires trained unbiased tasters. The two options currently under review for testing oils according to the proposed sensory standards are: (1) develop a panel of trained USDA staff as tasters, and seek recognition for that panel from the IOC, which could take 18 to 24 months, or (2) contract with an independent sensory panel.

One of the primary issues that arose was the need to establish a marketing order in California that would provide the legal clout and financial support to enforce the standards. Marketing orders are governed by the Marketing Order Administrative Board and essentially support a set of laws defined by an industry to enforce standards and/or distribute funds to conduct research and market promotion. In order to establish a marketing order, a proposal would have to be approved by a 2/3 majority of the commercial domestic growers representing 2/3 of the sales volume. Developing a marketing order takes about 2 years. In order to have the marketing order's standard enforced on imported olive oils, the US congress would also have vote to include olive oil within US law. An olive oil marketing order would likely be patterned after other commodity marketing orders that assess each grower for funds to pay for the collection and analysis of samples, enforcement of the defined standards, and any other desired activities such as research and market promotion.

—Paul Vossen

## Specialty Table Olive Processing Course

This course concentrates on the natural processing of table olives as traditionally done around the Mediterranean. Find out about history, culture, health & safety and equipment. You will also learn the steps involved in processing, and applicable standards. The course is led by Stan Kalis, olive and olive oil specialist and professional fellow at the School of Plant Biology, University of Western Australia.

**November 14 & 15, UC Davis**  
[www.extension.ucdavis.edu](http://www.extension.ucdavis.edu)

(Yield, cont. from p.2) malaxation time and temperature, and extraction machinery type. Some varieties give up their oil quite easily and others hold on to it as an emulsion (watery gel) that escapes with the fruit-water or pomace solids. The fruit's water content influences the percentage of oil relative to moisture, so drier fruit will have a higher percentage of oil by weight. It is difficult to extract the oil from fruit that has been over-irrigated and has a high moisture content. Table 2 indicates by variety, fruit moisture, and ripeness the approximate theoretical oil yield extracted from a ton of olives. It is logical to expect about 3 to 4 tons olives per acre and to be able to extract about 40 gallons of oil per ton, but there are so many variables that it is hard to be accurate with oil yield predictions.

—Paul Vossen 

**Table 2. Approximate Oil Yield from 1 Ton of Olives with Different Oil Content and Extractability (% on wet weight basis)**

Olive Variety – Water Status - Ripeness	Oil Yield
Green over-watered Sevillano	10 gal of oil/t 4 % = 37.9 liters
Ripe Sevillano - Green Ascolano	15 gal of oil/t 6 % = 56.8 liters
Very ripe Sevillano – Ripe Ascolano	20 gal of oil/t 8 % = 75.7 liters
Over-watered, green Arbequina or Manzanillo Very ripe deficit-irrigated Ascolano	25 gal of oil/t 9.5 % = 94.6 liters
Ripe over-watered Arbequina or Manzanillo Green over-watered Frantoio, Leccino	30 gal of oil/t 11 % = 113.5 liters
Very ripe Arbequina, Manzanillo–Green over-watered Mission, ripe over-watered Frantoio, Leccino	35 gal of oil/t 13 % = 132.5 liters
Ripe Frantoio, Leccino – Green Mission Deficit-irrigated Arbequina or Manzanillo	40 gal of oil/t 15 % = 151.4 liters
Ripe over-watered Mission Ripe, deficit-irrigated Frantoio, Leccino	45 gal of oil/t 17 % = 170.3 liters
Ripe Mission, Picual	50 gal of oil/t 19 % = 189.3 liters
Very ripe, deficit-irrigated Mission, Picual	55 gal of oil/t 21 % = 208.2 liters

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# UPCOMING EDUCATIONAL EVENTS

- **Specialty Table Olive Short Course—Nov 14 & 15, 2006 at UC Davis**  
For information, call Bill Krueger, Farm Advisor, 530-865-1107 or [www.extension.ucdavis.edu](http://www.extension.ucdavis.edu); 800-752-0881
- **Olive Oil Production, Processing and Evaluation (SusAg 118)**  
Santa Rosa Jr. College – Classes start Nov. 16, 2006. For info [www.santarosa.edu](http://www.santarosa.edu)
- **Sensory Evaluation of Olive Oil—Mar. 30 & 31, 2007 at UC Davis**  
For info or to register: [www.extension.ucdavis.edu](http://www.extension.ucdavis.edu) or call 800-752-0881

## The Maturity Index: Quantifying Ripeness

Most of our readers have at least heard of the maturity index (MI), and hopefully many of you use it already. This article is a basic “what-is?” and “how-to” for the newbies in the crowd, and it introduces a nifty new tool for you seasoned olive ranchers out there.

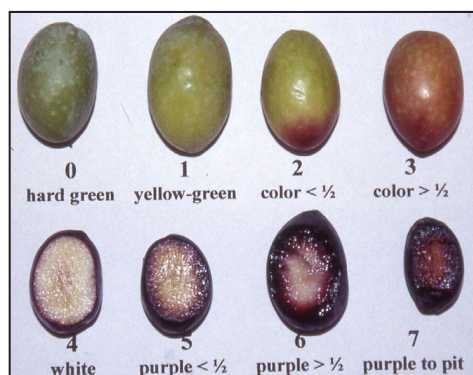
First, the introduction and explanation for those who have yet to explore the index. The MI is an attempt to quantify the ripeness of the fruit. Think of it as the brix for olives, if you will, but instead of measuring the composition of the fruit, it is a visual index.

To figure out your MI, you harvest about 2 lbs of fruit (a single variety) from all over the orchard and all parts of the trees. Mix the olives thoroughly and draw 100 olives at random. These are sorted into degrees of ripeness from 0 to 7 (see picture). The number of fruit in each category is then multiplied by the category number. These products are added up, and the sum is divided by 100. Draw 100 more olives and repeat the process until the olives are gone.

The MI is a somewhat subjective measure; two people assessing the same 100 olives will have slightly different MIs. This is inevitable since one person’s yellowish-green may be another person’s pale-orangey-yellow-with-a-pink-blush. (If you are color blind, it might be a good idea to get someone else to do this particular job) The best way to ensure consistency is to have the

same person do the index every year.

And what does the MI tell you anyway? Our research is indicating that a 3.4 Leccino from a cool coastal area and a 3.4 Leccino from an inland valley are very different in degree of ripe flavor. The MI is most useful as a site-specific tool for recording information from year to year. *Your* 3.4 Leccino does mean something compared to your 2.7 Leccino. And that is what you want to know: how to repeat (or avoid!) the character of your oil from one year to the next.



Hopefully the value of the index is obvious by now; it is clearly a vital part of a good record-keeping program for a producer. Before I move on to the nifty new tool I mentioned, I want to share a few observations. First, a word about Arbequina. This popular variety presents a particular challenge when doing the MI: basically an Arbequina stays yellow almost forever. So you will need to put on your ultra-perceptive color eyes when you do your MI. I have learned that there are subtle differences between

the yellows, and subtle changes in the softness of the fruit. In order to reflect this difference in maturity, I classify an Arbequina that is superficially a yellow-green (a 1) as a less-than-half-pink (a 2) if it has started to get an orange cast to the yellow—the faintest suggestion of a blush, as it were.

You may also find that you have varieties that seem to skip stage 4, going straight from a 3 to a 5. I always cut into any olive that is a suspected 4 or above to verify the ripeness of the flesh. You will quickly become familiar with the idiosyncrasies of your varieties, and develop a consistent way to classify them. Do the MI several times and average the results; the more samples you take, the more accurate your results will be.

Okay, you seasoned ranchers, thank you for your patience! Here is the promised nifty thing: I have created a little maturity index calculator in Excel. You simply type in the number of olives in each category and it will tell you the MI. It also tells you the total number of olives, so if it isn’t 100 you know you slipped up (in those cases, add to the category with the largest number of fruit; that will impact your average the least. Or go get more olives.)

Download the calculator at <http://cesonoma.ucdavis.edu/Horticulture/HorticulturePublications.htm> (you will need MS Excel to use it). There is also a handout on the MI. I hope they’re useful during the coming harvest.

—Alexandra Devarenne



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