

# Olive Oil Production in Italy

*Technical Report on the Olive Oil Production Tour (11-25 to 12-9, 2000)*

By Paul Vossen



The country of Italy, is bounded on the north by Switzerland and Austria; on the east by Slovenia and the Adriatic Sea; on the south by the Ionic and Mediterranean Seas; on the west by the Tyrrhenian Sea, the Ligurian Sea, and the Mediterranean Sea; and on the northwest by France. The Italian Peninsula is a long projection of the continental mainland shaped much like a boot about 850 miles long and 380 miles wide. In addition to the mainland, the country is comprised of the islands of Sardinia, Sicily, and many lesser islands.

## Topography

On the northern frontiers are the Alps, which include such high peaks as Monte Cervino 14,692 ft. and Monte Rosa, which rises to its highest point 15,203 ft. in Switzerland just west of the border. Between the Alps and the Apennines, which form the backbone of the Italian Peninsula, spreads the broad Plain of Lombardy, comprising the valley of the Po River. Only about one-third of the total land surface of Italy is made of plains. The Apennines consists of several chains and forms the watershed of the Italian Peninsula.

Bays, gulfs, and other indentations, which provide a number of natural anchorages, break up the western coast of Italy. In the northwest is the Gulf of Genoa, the harbor of the important commercial city of Genoa. Another leading western coast port is situated on the beautiful Bay of Naples, dominated by the volcano Mount Vesuvius. A little farther south is the Gulf of Salerno, at the head of which stands the port of Salerno. Along the middle of the western coast are three stretches of low and marshy land, the Maremma, Campagna di Roma, and the Pontine Marshes.

The northeast coast of Italy along the northern Adriatic Sea is low and sandy, bordered by shallow waters and, except at Venice, not readily accessible to oceangoing vessels. From a point near Rimini, southward spurs of the Apennines fringe the eastern coast of the peninsula. The southeastern end of the peninsula is deeply indented by the Gulf of Taranto, which divides the so-called heel of Italy (ancient Calabria) from the toe (modern Calabria). The Apennine range continues beneath the narrow Strait of Messina and traverses the island of Sicily, where the volcano Mount Etna, 10,902 ft high, is located. In addition to volcanic activity, frequent minor earthquakes, especially in the southern regions also plague Italy.

Italy has many rivers, of which the Po and the Adige are the most important. The Po, about 405 miles long and with its tributaries affords about 600 miles of inland waterways. The Adige, about 255 miles long, enters Italy from the Austrian province of Tyrol, flows east, and, like the Po, empties into the Adriatic.

The rivers of the Italian Peninsula are shallow, often dry during the summer season, and consequently of little importance for navigation or industry. The chief peninsular rivers are the Arno and the Tiber. From its sources in the Apennines, the Arno flows west for about 150 miles, through a well-cultivated valley and the cities of Florence and Pisa. The Tiber rises not far from the sources of the Arno and runs through the city of Rome.

Both the northern and peninsular regions of Italy have numerous lakes. The principal lakes of northern Italy are Garda, Maggiore, Como, and Lugano; the peninsular lakes, which are considerably smaller, include Trasimeno, Bolsena, and Bracciano.

### **Climate**

The climate of Italy is highly diversified, with extremes ranging from frigid in the higher elevations of the Alps and Apennines, to semitropical along the coast of the Ligurian Sea and the western coast of the Lower Peninsula. The average annual temperature ranges from 52° F in the Po Valley to 66° F in Sicily. Climatic conditions on the peninsula are characterized by regional variations, resulting chiefly from the configurations of the Apennines, and are influenced by tempering winds from the adjacent seas.

In the lowland regions and lower slopes of the Apennines bordering the western coast from northern Tuscany to the vicinity of Rome, winters are mild and sunny, and cooling Mediterranean breezes modify extreme temperatures. Temperatures in the same latitudes on the east of the peninsula are much lower, chiefly because of the prevailing northeastern winds. The climate of the Plain of Lombardy is continental with hot summers and severe winters (temperatures as low as 5° F). The climate of the peninsular lowlands below the latitude of Rome has a southern Mediterranean subtropical climate with an average winter temperature of 57°F.

Heaviest precipitation occurs in Italy during the fall and winter months, when westerly winds prevail. The lowest mean annual rainfall, about 18 inches, occurs in the Apulian province of Foggia in the south and in southern Sicily; the highest, about 60 inches, occurs in the province of Udine in the northeast.

### **Population & Government**

According to the 1996 census, the population is 57,460,274; the average population density is about 494 per mile<sup>2</sup>. The Italian population consists almost entirely of native-born people, many of whom identify themselves closely with a particular region of Italy. The country can be generally divided into the more urban north and the mostly rural south. The more prosperous north contains most of Italy's larger cities and about two-thirds of the country's population; the primarily agricultural south has a smaller population base and a more limited economy. In recent decades the population has generally migrated from rural to urban areas; the population was about 71 percent urban in the mid-1990s.

Administratively, Italy is divided into 20 regions, each of which is subdivided into provinces and communes. The capital and largest city of Italy is Rome (population, 2,775,250), which is a famous cultural and tourist center. Other cities with populations of more than 300,000 include Milan (1,369,231), an important manufacturing, financial, and commercial city; Naples (1,067,365), one of the busiest ports in Italy; Turin (962,507), a transportation junction and major industrial city; Palermo (698,556), the capital and chief seaport of Sicily; Genoa (678,771), the leading port in Italy and a major trade and commercial center; Bologna (404,378), a major transportation center and agricultural market; Florence (403,294), a cultural, commercial,

transportation, and industrial center; Bari (342,309), a major commercial center; Catania (333,075), a manufacturing and commercial city of Sicily; and Venice (309,422), a leading seaport, cultural, and manufacturing center.

Italy has been a democratic republic since June 2, 1946, when the monarchy was abolished by popular referendum. Although Italy's tumultuous politics have produced more than 50 different governments since the advent of the democratic system, order is maintained through a well-established bureaucracy that supports the elected offices.

## **Culture**

The dominant religion of Italy is Roman Catholicism, the faith of about 84 percent of the people. However, the Catholic Church's role in Italy is declining; only about 25 percent of Italians attend mass regularly, and a law ratified in 1985 abolished Roman Catholicism as the official state religion and ended mandatory religious instruction in public schools. The constitution guarantees freedom of worship to the religious minorities, which are primarily Protestant, Muslim, and Jewish.

From antiquity to modern times, Italy has played a central role in world culture. Italians have contributed some of the world's most admired sculpture, architecture, painting, literature, and music, particularly opera. Although the nation was politically unified less than 150 years ago, the Italians do not consider themselves to be a "new" people, but see themselves instead as the descendants of the ancient Romans. Moreover, regional differences persist because of natural geographical boundaries and the disparate cultural heritage that has come down from the Greeks, Etruscans, Arabs, Normans, and Lombards. Regional particularism is evident in persistent local dialects, holidays, festivals, songs, and regional cuisine.



*Ceramic museum piece showing ancient olive harvest*

Italy is rich in important library collections. Among the largest and most valuable libraries are the national libraries in Florence, Naples, and Rome. Several universities also have large libraries. Smaller collections, rich in local manuscripts and incunabula (books printed before 1501), are found in most Italian cities.

World-famous art collections are housed in numerous Italian cities. Among the most important art museums are the Uffizi Gallery and Medici Chapel in Florence, the National Museum in Naples, and, in Rome, the Villa Giulia Museum, the Galleria Borghese, and the National Gallery of Modern Art. Vatican City has important art collections in its museums and chapels; the most famous of which is the Sistine Chapel. An international biennial exhibition of visual arts in Venice is world-renowned.

## **Economy**

A largely agricultural country before World War II (1939-1945), Italy has developed a diversified industrial base in the north, which contributes significantly to the economy. In the early 1990's the gross domestic product (GDP) was estimated at \$991.3 billion, or about \$17,420 per capita; industry contributed about 28 % to the value of domestic output, business and finance 31 %, agriculture 4 %, and services about 37 %. Italy has a private-enterprise economy, although the government has a controlling interest in a number of large commercial and manufacturing enterprises, such as the oil industry, transportation, and telecommunication.

Unemployment remains a problem throughout the country at about 11 percent of the working-age population. The large national debt has also plagued Italy's economy: The annual national budget of Italy in the early 1990s included revenue of about \$302 billion and expenditure of some \$391 billion. In keeping with provisions of the European Union, Italy is attempting to reduce its budget deficit. Progress was evident by the mid-1990s, with the debt reduced to 9 percent of GDP, although still far from the goal of 3 percent.

### **Agriculture**

Nearly 60 percent of the land area of Italy is devoted to crops and pasture. Agriculture, with fishing and forestry, engages about 8 % of the labor force. Variations of climate, soil, and altitude allow the cultivation of many types of crops. Italy is one of the world's leading producers of olives and olive oil. The



*Italian farm laborers ready for harvest*

output of olive oil is about 435,000 metric tons annually, which represents 25% of world production. An additional 75,000 tons of table olives are produced annually. Italy's 2.5 million acres of olives (about 13% of the world's 19.8 million olive acres) are mostly located in the central and south of the country. Per capita consumption of olive oil in Italy it is around 48 cups per person compared to about 2.5 cups per person in the US.

Italy is also one of the leading nations in the production of grapes, and ranks among the world's foremost wine producers. Italian wine production is about 1.7 billion gallons annually. Chief field crops, ranked by approximate value and annual production in metric tons, include wheat (8.9 million), tomatoes (5.5 million), maize (7.2 million), sugar beets (14.3 million), apples (2.4 million), peaches (1.9 million), potatoes (2.5 million), soybeans (1.4 million), and rice (1.2 million). Other field crops are barley, rye, artichokes, chili peppers, and watermelons. Other orchard crops prominent in the Italian economy include pears, oranges, figs, dates, and nuts. Dairy farming is a major industry. About 50 kinds of cheese are produced, including Gorgonzola, Pecorino, and Parmesan. The livestock industry also produces many specialized meat products,

### **Foreign Trade**

Italy dramatically increased trade between other member countries of the European Union in the 1970s and 1980s. The dependence of Italy on imported coal, petroleum, and other essential raw materials usually yields an unfavorable balance of trade. This imbalance is partly offset by the tourism industry, remittances from Italian nationals in foreign lands, and shipping revenues. In the early 1990s Italian exports earned about \$178.2 billion per year and imports cost about \$188.5 billion. Exports include machinery, motor vehicles, clothing, textile yarn and fabrics, footwear, iron and steel, fruit and vegetables, and wine. Imports include machinery and transportation equipment, petroleum, metals, chemicals, textile yarn and fabrics, and meat.

Currently the US consumes about 7% of the world's olive oil. The US imported 48 million gallons of olive oil in 1998, which was a 35% average increase over the three previous years. Most of that (73%) comes from Italy. Many Italian companies also buy oils from other countries, process it, blend it in various ways, and then market it in the US. The actual "Country of Origin" where the olives were grown, therefore, may not be known.

## TRIP ITINERARY

**Saturday Nov. 25:** Travel to Italy  
**Sunday Nov. 26:** Arrival in Sardinia – Nora, Phoenician Ruins  
**Monday Nov. 27:** Sardinia, Cagliari - Villasor Consorzio – Oliena Coop & Orchards – Oristano  
**Tuesday Nov. 28:** Sardinia, Gonnosfanadiga – Santa Barbara Coop Mill – Santadi Cellars  
**Wednesday Nov. 29:** Arrival in Puglia, Bari – Asso.pr.oli Coop Mill & Orchards  
**Thursday Nov.30:** Puglia, Andria – Asso.pr.oli Coop & Orchards – Masserie di Sant’Eramo  
**Friday Dec. 1:** Arrive in Florence – U of Florence Research Station Fields – Taste Panel  
**Saturday Dec. 2:** Toscana, Sante Dame Research Mill – Il Corno Mill and Fields  
**Sunday Dec. 3:** Toscana, I Bonsi Mill and Orchards – Florence, Laudemio Marketing  
**Monday Dec. 4:** Umbria, Mancianti Mill – Faena Orchards – Lungarotti Museum  
**Tuesday Dec. 5:** Toscana, Sonnoli Nursery – Mansi Bernardini Estate – U of Pisa  
**Wednesday Dec. 6:** Liguria, Ardoino/Isnardi Mill  
**Thursday Dec.7:** Liguria, Isnardi Mill & Orchards– Carli Mill and Museum  
**Friday Dec. 8:** Travel to Nice France  
**Saturday Dec. 9:** Air Travel to California

### Tour Attendees

Bob Adamson	Gayle Dunlap	Carl Muia
Dorothy Adamson	Alfred Herbermann	Charlotte Muia
Howard Balsdon	Cathy Herbermann	Todd Ruffoni
Paul Bernhardt	Marciel Klenk	Elena Scola
Allison Chittum	Francis Lightly	Ellen Sullivan
Darrell Corti	Kathleen Lightly	Gary Verboon
Mary Jane Drinkwater	Margaret Lunt	Paul Vossen
Bob Dunlap	Gio Martorana	Diane Wallace

### SARDINIA – Nora - Villasor Consorzio – Oliena Coop & Fields – Oristano

**Nora:** We made it to the Nora ruins, right at sunset, energized to walk off the hours of air travel and wide variety of very tasty seafood we consumed for lunch at the Ottagono restaurant. Nora is the site of archeological ruins from 1,000 to 600 BC of the Phoenicians, a people originally from the area that is now Syria and Lebanon. There are numerous stone walkways, rock walls, and colored



*Kathy Herbermann in front of exposed rocky Sardinian soil*

rock inlayed floors in a beautiful setting at the edge of the sea. Dinner was in Cagliari that evening where we tasted more of the local cuisine, wines, and olive oils.

**Villasor Consorzio:** The

next day we traveled by motorcoach to the Villasor Consorzio Interprovinciale per la Frutticoltura near Cagliari and met with Dr. Giovanni Bandino. Our host for the day was Pierpaolo Arca. We saw their oil tasting room with individual booths, experimental mill, oil storage area, production mill, and laboratory.

#### ***Lunch Cagliari: Ottagono Restaurant***

- Bottarga (salted pressed mullet roe)
- Shrimp, octopus, squid, mussels, breaded mussels, eel, lobster
- 1998 Vermentino di Gallura
- Limoncello, Mirto, & Grappa

#### ***Dinner Cagliari: Ristorante dal Corsaro***

- Cernia (large mouthed white fish)
- Pasta with fish & tomato sauce
- Bottarga (mullet roe)
- Anchovies, smoked swordfish, bottarga
- 1990 Vernaccia di Oristano Contini
- 1999 Alghero Torbato Terre Bianche
- 1999 Vermentino di Sardinia
- 2000 Novello Rubicante Isola Nuraghi

*Villasor Consorzio olive oil tasting room and inside an individual booth*



Their production facility was all Rapanelli equipment including 3-phase decanter and sinolea selective filtration equipment. The laboratory had extensive liquid chromatography, gas chromatography, magnetic nuclear resonance, spectrophotometric, rancimat, and conventional laboratory equipment. Many experiments have been conducted to steadily improve the quality of Sardinian olive oil. We tasted some recently made oil from a blend of local varieties, primarily Bosana, and found it to be extremely fruity, clean, slightly pungent, slightly bitter, and very well balanced.

The facility is a public-private cooperation promoting experimentation on practical grower problems. They have their own nursery and teach improved nursery practices along with pest management, cultural aspects of olive growing, varietal evaluation, and they are breeding new olive varieties. At the mill, they have characterization studies for the different varieties, organoleptic analysis, and storage experiments. One experiment was comparing storage of oil with and without nitrogen in the tank headspace. Another was comparing filtered and unfiltered oils over time.

Most olives are harvested by hand because of the steep ground, but some is harvested with shakers. Labor cost is about \$40 – 50 per day. EU subsidies have been very important economically for producers. Current production on the Island of Sardinia is on about 100,000 acres producing an average of 10,000 tons of oil annually (26 gallons/acre). Historically, Spain heavily influenced Sardinia and many of the varieties grown were originally from Spain. In the 19<sup>th</sup> century, there was a regional promotion to graft the wild Oleaster to known olive varieties and to plant grafted varieties in exchange for knighthood. Varieties grown in the area include:

- Bosana: The most important variety on Sardinia representing over 50% of the production. A precocious regular producer that matures late in the season. Oil quality is excellent, very stable, high in polyphenols, antioxidants, and it has a notable intense fruity, bitter, and spicy character. It contains 20% oil and is commonly used to renew tired oils. It is well suited to closer spacing, central leader training, is pendulous in form, and is only mildly sensitive to olive fly.
- Tonda di Cagliari: A dual purpose variety grown near Cagliari with large fruit, good pit to pulp ratio, mild flavor and used for table fruit and oil.
- Pizz'e Carroga (Bianca): A dual-purpose variety, which is used mostly for table fruit. It is very sensitive to all of the olive pests, but does well under irrigated intensive growing conditions. It matures early and it produces very mild sweet oil.
- Semidana: Another important variety for oil that is quite productive, precocious, and therefore lends itself to higher density planting. The oil from this variety is medium fruity, bitter, and pungent, which is used to balance other varieties, especially Bosana.



*Bosana olives in Sardinia*

- Nera di Gonnos: A dual purpose olive that has some resistance to olive fly and peacock spot. The oil from this variety is mildly fruity, well balanced, and has an artichoke flavor.
- Nera di Villacidro: A dual-purpose variety that matures late with a high degree of resistance to all olive pests (good for organic production). The oil quality is good with a mild olive fruitiness and slight citrus flavor.

The area around Cagliari on the island of Sardinia receives about 15 to 40 inches of rainfall, but only during the three months of Nov. to Jan. The remaining 9 months are dry and the summers are very hot. Frost is very rare. The trees were all of relatively short stature, about 10 feet tall.

**Oliena:** We traveled about 110 miles north into the mountains past Nuoro to the village of Oliena and the Olivicoltori Cooperativa where we met with Sebastiano Fadda, the head of the Coop and taste panel. The people of Oliena are descendants of the Barbarians who planted the variety Nera di Oliena in the 1600's and Bosana in the 19<sup>th</sup> century. Bosana is believed to be synonymous with a Spanish variety called Palma. In the past, farmers were granted nobility if they grafted 4,000 of the wild Oleaster bushes to improved varieties.



*Sardinian olive orchard near Oliena*

Most of the olive farming is done organically and harvested by hand or with rakes onto nets spread under the trees. Half of the cost of production is harvest labor. The area has 7,600 acres of olive groves in non-intensive systems. They produce 35 to 200 gallons per acre per year of oil depending on the alternate bearing cycle of production. The rocky granite and calcareous soils of the region are poor, but olives have done well. Wine grapes and sheep are also farmed.

The Cooperative oil processing facility had two lines operating, one organic and one for conventionally grown fruit. All the equipment was the Alfa Laval brand including the new disc crusher that they felt made better oil from the Bosana variety (milder). There were only 12 mills in the area using disc crushers while 108 were using hammermills. None of the processors has used stone crushers or presses since 1979. Almost all of the decanters were 3-phase machines. The solid waste was returned to the fields as fertilizer and the fruit water was being pumped back onto the orchards.

We also visited their cheese and wine cooperatives where they make Cannonao variety wine called Nepente and Pecorino Romano and Ricotta cheeses. We ate lunch in Oliena.

**Contini Winery and Piredda Mill in Oristano - Cabras:** In the mid-afternoon, we tasted the famous Vernaccia di Oristano and saw how it was made at the Contini winery in Cabras, very near Oristano. This white wine is stored in wooden barrels for many years, producing an oxidized, non-fortified sherry. We had a personal tour by the owner Paolo Contini. Afterwards we visited an old rock convent building that was restored and converted into an olive oil press-house with all new Perialisi equipment at a cost of approximately \$600,000. Their brand was Casa Dall' Olivo from the Azienda Agricola, owned by Giuseppe Piredda. The property was 250 acres, all in organic

**Oliena Coop Lunch: Ristorante Sa Corte**

- Pecorino cheese & Corradi sheep's milk cream cheese
- Prosciutto crudo & sausage
- Pane carasau (thin bread)
- Porceddu (roast suckling pig)
- 1999 Nepente (Cannonao) di Oliena

**Dinner in Oristano: IL Faro Ristorante**

- Vernaccia di Oristano Brut - Simis
- Antipasti – eel with cheese
- Pasta - squid & potatoes in tomato sauce
- Clam soup
- White fish
- Fruit & Macaroons
- 1999 Nuragas di Cagliari
- 1996 Niederra della Valle del Tirso
- 1997 Vernaccia di Oristano – Contini

production. The mill ran a double line with a capacity of 23,000 liters per day from the 2 phase system decanters. The fresh oil was very fruity and crisp, primarily from the Bosana variety. The fruit was handled with extreme care to produce a very fine gourmet product. Dinner was in Oristano.

### **SARDINIA - Gonnosfanadiga, Coop Santa Barbara – Santadi Cantina**

**Santa Barbara Cooperative:** We met with G. Luigi Manca, who gave us a tour of the processing facility, which can process 70 tons of fruit per day. The 1,134-member cooperative has a very modern plant using two lines with Peralisi equipment, including machines for leaf removal, hammermill, disc mill, malaxator, 2 ½ phase decanter, and centrifuge. They have made a huge commitment to quality over the last few years. Mr. Manca indicated to us that the oil is really made in the field and that the processor just needs to not ruin it. They emphasize good fruit quality coming into the mill; the fruit is transported in plastic lug boxes, and always processed within 24 hours. The processing temperature is kept down to no more than 85° F, and recently extracted fruit-water is injected into the centrifugal decanter to avoid diluting out the polyphenols in the oil.



*Conical shaped tank bottoms  
for ease of sediment removal*

They store all their oil in stainless steel tanks with conical shaped bottoms for ease of sediment removal. All of the oils are filtered before bottling. The cooperative label depicts the Van Gogh “Olive Orchard” painting and is the Sibiri brand. We tasted the oil as it was dripping out of the centrifuge. It was extremely fruity and crisp, once again indicating the high quality of the local varieties.

The Santa Barbara Cooperative members represent 982 farms and processed 36,940 tons of oil olives in 1999. The cooperative has devoted 750 acres to organic production and wants to expand that program. Most of the older plantings are on about 30-ft. X 30-ft. spacings, but any new plantings are going in at around 20-ft. X 7-ft. spacings. Some orchardists are installing irrigation systems when water is available. Most of the orchards are pruned to the open vase shape with at least one meter of trunk for possible placement of the mechanical shaker, though most of the fruit is still hand harvested. The trees are typically spring fertilized with manure, urea, and lime; then tilled to incorporate the fertilizer and to control weed growth for water conservation.



*Santa Barbara Cooperative label*

Another part of the cooperative is the table olive processing unit, which primarily uses the varieties Tonda di Cagliari and Bianca. The olives are placed in large vats with a 10% saline solution and a pH of 3 to 4.5. A starter (mother brine) is added and the fruit goes through lactic acid fermentation for 6 – 8 months. The fruit is checked every 20 days and adjustments are made to the solution if necessary. No lye is used in the process. When the fermentation is finished, the olives are packed into containers with a fresh brine solution. It was indicated that the return on table fruit was double that of oil.



**Cantina Santadi:** The Santadi winery is located in the village of Santadi a few miles southwest of Cagliari. It is a cooperative with 250 members farming 1,235 acres with the average producer farming about 3 acres. They produce about 2.5 million liters of wine from Chardonnay, Vermentino, Carignane, Shiraz, and Monica grapes.

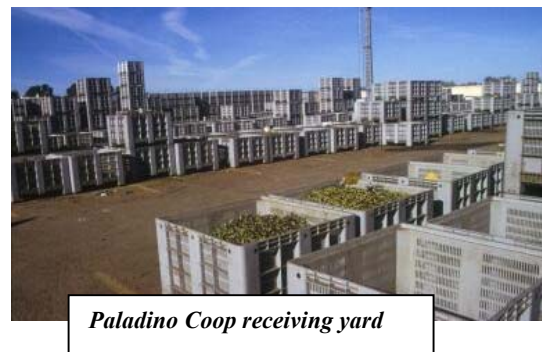
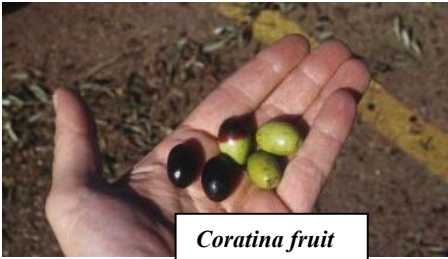
**PUGLIA – Bari, Assoproli Coop. Mill & Orchard –  
Masserie di Sant’Eramo**

**Assoproli Cooperative:** We met our host Nicola Perrucci, a master taster and oil blender in the region for two days of investigation of olive oil mills and orchards in the Puglia region. He first took us to the Assoproli Cooperative mill in Bari. ASSO.PR.OLI is the Associazione Produttori Olivicoli, which is an association of 20 large cooperatives and about 40,000 growers, started in 1978, and representing the “Terre di Bari.” The region of Puglia is quite rich agriculturally; producing 9.1% of Italy’s agricultural value. It ranks first in production of table grapes, olive oil, tomatoes, salad greens, potatoes, zucchini, and durum wheat. Olive oil production is second in the region to table grapes, which is obvious by the vast table grape vineyards and olive orchards in the countryside.

- Lunch at Ristorante L’ Antico Borgo**
- Sole (fried fish)
  - Octopus in olive oil
  - Mosciame of Tuna (dried tuna fillet)
  - Baccala fritters (dried salt cod in batter)
  - Rice with oyster mushrooms
  - Orata fish – grilled
  - Celery and lettuce with olive oil
  - 1999 Villa Solais Vermentino di Sardinia
  - 1999 Villa de Chiesa Vermentino di Sardinia
  - 1996 Sardana (Carignano & Shiraz)
  - 1996 Terre Brune (Carignane)
  - 1997 Rocca Rubia Riserva (Carignane)
  - 1998 Latina vendemmia tardiva di uva Nasco

Typical olive varieties grown in the area include:

- **Coratina:** The predominant variety grown for its extremely high fruitiness quality characteristics. It matures very late and often never turns black. Coratina is primarily self-fertile and is often grown in solid blocks without pollenizer trees. Some growers have, however, used Ogliarola as a source for cross-pollination. It comes into bearing early, is very product, and is very cold tolerant.
- **Ogliarola:** An early maturing variety used as a pollenizer for Coratina. Self-incompatible, oil quality is high and characteristic of the Bitonto area; oil yield is high.
- **Bella di Cerignola:** A table variety with large fruit, early bearing, partially self-fruitful, early ripening, and has a low oil content.



At our first stop in Bari, we visited the Paladino cooperative mill. It has 500 grower members. We observed the delivery of fruit in ½ ton gray plastic bins. The fruit was placed in the mill yard and labeled according to producer. It was sampled by a representative of the mill for fruit quality and designated for a specific milling time with other similar fruit. Most of the fruit was kept in the bins for 20 to 24 hours prior to milling to soften and lose some of its field moisture.

There was a hydraulic comb type harvester parked in the olive storage yard and we asked the owner to demonstrate how it works. The tractor had a four-jointed hydraulic arm that extended about 25 feet in front of the tractor. At the end of the arm was a five foot long rotating cylindrical brush with 8 inch long plastic fingers spaced about 3 inches apart. The working motion was back and forth

while the operator moved the brush up and down the outside of the tree canopy. Unfortunately, we did not get to see it in action in an orchard.



*Brush-like mechanical harvester*

The mill had several options for milling the fruit. It had two stone mills, one with six granite wheels and one with three. The stones were used primarily for milling the variety Coratina in order to reduce its bitterness and pungency. It was also set up to crush the olives in a hammermill or in a new disk-type mill. All of the equipment was the Peralisi brand including the three-phase decanters.



*Palladino Coop fruit elevator*



*Mill with six stones at the Palladino Cooperative*



*3-phase decanter at Palladino Coop*

Upon separation, the oil was

immediately placed in a temporarily until it was tanks for long-term storage. bottling, they frequently use a gravity filter (“alla-barese”), an upper stainless steel tub inches deep filled with oil. A of course cotton is held in a chamber below the top repository. The oil simply down through the cotton by filters out much of the New oil takes about 1 hour to months takes about ½ hour to use a diatomaceous earth bottlings when completely system mixes DE with the oil inside a small tank then pumps the oil through a filter membrane that takes all the DE, water, and fine particulate matter out of the oil.



*Alla-barese filter showing the oil in the top passing through cotton and dripping into the reservoir below*

underground storage tank pumped into stainless steel storage

Before cotton which has about 12 thick mat removable



*Cotton used to filter olive oil in the alla-barese method*

flows gravity, which particulate matter.

filter and oil stored for two pass through the filter. They also (DE) filter for certain oils and clear oil is desired. This filter

They gave us a price list for retail sales of oil from the cooperative mill store. Prices were as follows:

- Non filtered Extra Virgin oil - \$ 4.23 per liter
- Filtered Extra Virgin oil - \$ 4.34 per liter
- Fruity Extra Virgin oil - \$ 4.75 per liter
- Certified Organic Extra Virgin oil - \$ 8.80 per liter (only sold in 500 ml bottles)

We also visited an olive orchard near Bari owned by one of the cooperative members. It had very old Coratina and Ogliarola trees trained to the open center shape with large pendulous branches on the exterior. The workers were harvesting by hand using tall ladders, two different styles of hand combs, and catching the fruit on the ground in large nylon nets. The fruit had some damage from olive fly and the grower indicated that they typically must spray at least twice per year with a conventional insecticide (Dimethoate) in order to control it. Every year is different, so they wait until the early season economic threshold of 8-10% damage before spraying and use monitoring traps to time the sprays. Most of the early season damaged fruit falls off prior to the harvest season and is not harvested or mixed in with the good fruit.



*Large Coratina tree near Bari*

**Masserie di Sant'Eramo:** At the private mill, Masserie di Sant'Eramo, we observed a system with a stone mill for initial fruit crushing, then the fruit passed through a small hammermill grinder in cases where a finer paste was desired. Either could be used alone in the line. The owner, Antonissa Perrone, and marketing director, Filippo Calderazzi, described in detail how the family has made a commitment to quality by controlling every



*Centrifuge at Masserie di Sant'Eramo*

aspect of the oil production process. While touring the mill, it was indicated that they had better separation with a delay between the centrifugal decanter and the final centrifugal separator. Since the centrifugal decanter causes some emulsification, the oil was allowed to settle for one hour prior to final separation in the vertical centrifuge.

They have their own orchards and select the perfect maturity dates for the fruit based on past experience for each variety. They pay particular attention to fruit quality. The mill has all modern extraction, filtering, storage, and bottling equipment. The unique bottle design won a fancy food show award in 1993. They sell a mild oil and a "rich and flavorful" oil along with several allied products including wine, vinegars, and various specialty gift bottles.

**Lunch at Masserie di Sant'Eramo**

- Sausage
- Fresh cow's milk Mozzarella
- Stuffed foccaica bread
- Cavatelli pasta with ceci & new oil
- 1999 Salento Rosato del Golfo
- 1999 Rosa del Golfo
- 1999 Negroamaro & Malvasia Nera
- Chocolate olives & cheese cake
- Limocello & Nocino liqueurs

**Dinner at Due di Ghiottoni (Two Gluttons)**

- Antipasto – cooked octopus, live jumbo & small shrimp, live cuddle fish.
- Rice with octopus & sardines
- Burrata (fresh mozzarella cheeses)
- Big bowl of licorice candy & gum drops
- Tropical fruit
- Cactus fruit pie, chocolate cake, whipped cream, and candied figs
- 2000 Praeludium Novello de Aglianico
- 1999 Negroamaro-Salentino Rosato
- 1999 Primitivo di Tarantino
- 1998 & 1999 Primitivo di Manduria Dunico
- 2000 Santa Teresa
- 2000 Grillo
- 2000 Susumaniello
- 2000 Ottavianello
- 2000 Tolleau in American oak
- 2000 Tolleau in French oak
- 2000 Cacc'e Mmitte
- 2000 Moscato



*Bottles on bottling line at Masserie di Sant'Eramo*

## PUGLIA - Andria – Zinfollino Orchard - Assopoli Bottling Plant – Pomace Oil Factory

**Zinfollino Orchard:** Once again we visited an orchard associated with the cooperative, but this time we traveled to the north of Bari into the area near Andria. We met with Domenic Zinfollino, the orchard owner. He was harvesting large Coratina trees with a tree shaker and nets spread on the ground to catch the fruit. The shakers removed about 70% of the fruit and then men with long poles beat the branches where any fruit remained.



Zinfollino orchard with a heavy crop

One orchard was 100% Coratina fruit, which is self-fruitful in that area. Coratina came from the nearby town of Corato and the name means “the little olive of Corato.” The grower felt that pollenizers for Coratina were not necessary even though in other areas they used Ogliarola as a pollenizer. The orchard trees were spaced 16.25 ft. X 26 ft. and 19.5 ft. X 26 ft. (103 to 87 trees per acre). In some cases the grower had interplanted another row down the middle in order to increase tree density. In other cases the distances

between trees was just right since the large trees were just touching each other down-the-row and almost touching between-rows. He said that in years with very heavy yields they harvest 8 to 10 tons per acre. If the trees are pruned every year the orchard yields slightly less than if pruned every other year.

Most of the orchards are now supplementary irrigated to boost production and to prevent the fruit from shriveling near harvest. He would apply more water if he had it. Temperatures are commonly over 100° F much of the summer and the trees are given only 100 gallons of water through a drip system every two weeks (about 14% of evapotranspiration). The soils vary considerably in that area in rooting depth from 15 feet deep in some areas to only 18 inches in others. They are mostly white limestone, volcanic tuft, and chalky calcareous soils. The orchard we visited was fertilized with two tons per acre of manure each year as the only source of nutrients. The orchard owner had experimented with cover crops, but found that the soils had a tendency to seal after about 5 years and prevent water infiltration. He also found that if the cover crops were mowed instead of tilled that they acted as weeds, used too much water, and the trees suffered from water stress.

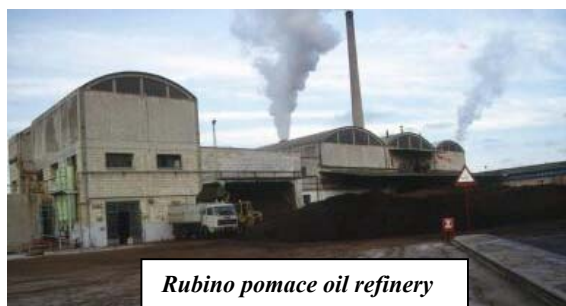
Domenic Zinfollino seemed to be a very innovative grower and he showed us a small experimental planting of FS-17 along with five other varieties he is trying, which are: Carolea, Frantoio, Ogliarola, Cima di Mola, and Leccino. He is trying some central leader pruning and told us that 30 years ago he tried pruning Coratina into a bush shape to keep the trees low. He found that the excessive pruning caused the trees to become too dense and shaded inside and overly vigorous. The trees were much less productive than larger, lower density plantings with open trees and more light.

**Cooperative Bottling Plant:** Later in the day we visited a huge bottling plant that was just starting to operate. It was designed to bottle all of the oil from all of the cooperatives and individual members in the area. The capacity of the line was 11,000 bottles per hour. At the time we were there, the glass bottle price was about \$0.32 each and they had several thousand stacked in storage. The plant was also equipped with a huge stainless steel tank storage facility and special blending tanks in order to make several different oil compositions.

Many of the oils produced are made from field run olives of mixed varieties; this is the traditional method. Nicola Perrucci, the master taster and blender for the Assopoli oils, however, is

instigating a program to harvest some of the varieties separately and plant more non-traditional varieties such as FS-17, Leccino, and Carolea in the area. They want to “sweeten” and soften the more pungent Coratina oils with a portion of their production in order to have another product for the market.

**Rubino Pomace Oil Factory:** In Italy, much of the waste olive oil pomace (containing about 8% oil) is sold to a pomace oil refinery where the remaining oil is solvent extracted. We had an opportunity to see one of these factories in operation just outside Bari. The solid olive waste is delivered in large dump trucks from the cooperatives and private mills in the area where it is stock piled until it can be moved through the process. The oil laden and wet (contains 40 % to 55 % moisture) pomace is dumped into a hopper via a large capacity front-end loader. It is elevated into a 3 ft. diameter steel tube that rotates as it is heated moving the pomace along until it is dried down to less than 5% moisture. The source of heat is spent pomace.

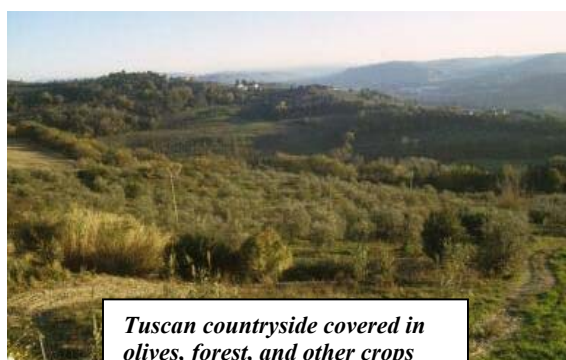


*Rubino pomace oil refinery*

The dried pomace is then moved into large tanks each with a capacity of several thousand gallons. Solvent (benzene or hexane) is added to saturate the dry pomace, which dissolves the oil into the solvent. Steam is then added to the tanks forcing the solvent-oil mixture into another tank. The spent pomace is then removed from the tanks in preparation for the next cycle.

The solvent-oil mixture is then heated and fractionally distilled to volatilize off the solvents leaving behind a thick dark solvent-extracted crude pomace oil. This is further refined by heating and driving off most of the volatiles to produce what we know of as pomace oil. It is often mixed with a small percentage of extra virgin oil to give it some flavor and color.

## TOSCANA – University of Florence Experimental Orchards & Mill - Oil Tasting



*Tuscan countryside covered in olives, forest, and other crops*

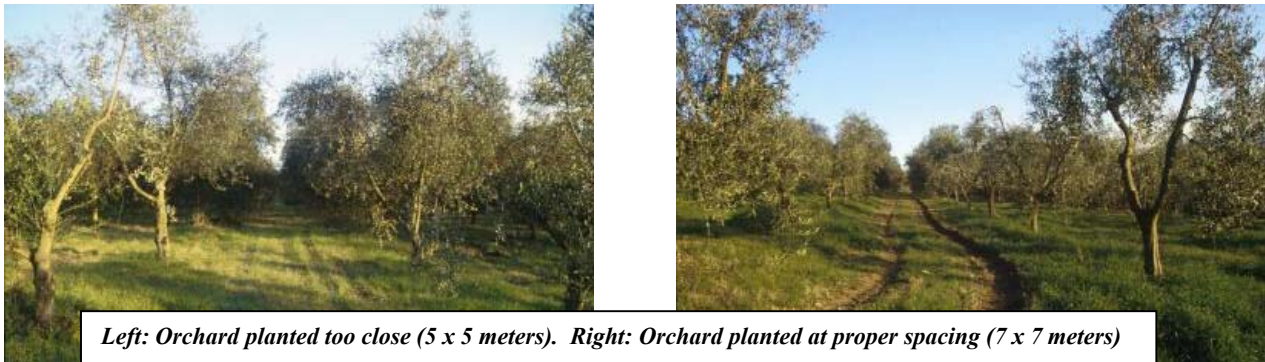
**U of Florence:** We met Professor Piero Fiorino at the airport and traveled with him on our bus through the countryside to the 400 acre University of Florence Experimental Orchards and Oil Mill near Talente – Val di Pesa. While traveling, we had an excellent opportunity to speak with Dr. Fiorino regarding the state of the olive oil industry in Tuscany. He said that the industry is in financial trouble because of the high costs of pruning and harvest, the relatively low yields from small-scale producers, and the hard freezes that

occasionally hit the region. He feels that if Tuscany receives another freeze, as it did in 1985, in which many of the trees were killed down to the ground, that much of the industry will not be replaced.

Hard freezes of varying magnitude are not rare in Tuscany. He told us that winter temperatures often reach 27°F and that is why most of the fruit is harvested green in November. In January it is not uncommon to receive temperatures as low as 14°F. In 1985 it got down to 4°F. It also rains in Tuscany in the spring, early and late summer months, and autumn, which can have a negative effect on fruit set, if during bloom, and can make harvest difficult, if the fields are muddy.

Professor Fiorino has been a leading olive researcher in Europe for many years. He has published several articles on orchard management, variety selection, and oil quality. He has conducted work on tree training systems at the University orchard, comparing central leader and open center pruning methods. His conclusions were that there was no significant difference in yield or harvest efficiency between the central leader (monocone) and open center systems. The monocone form, however, was much more difficult and expensive to prune and maintain. His harvest efficiency trials included both hand harvest and mechanical harvest using tree shakers (Italian vibrators). Most of the fruit in the region is harvested with mechanical shakers mounted on small caterpillar tractors.

In another pruning trial some trees were only pruned once, every 5 to 7 years, just to renew the trees. He found that this method worked well economically since production was not significantly affected (over the 5-7 year period) and pruning costs were considerably less. The main reason for including this method with his trials was because skilled pruners have become difficult to find. Most of the skilled pruners are now getting too old to work in the fields and the Tuscan youth are not interested in pruning olive trees for a living.



We saw an orchard that demonstrated shading and light penetration problems from spacing that was too close between trees (5 x 5 meters = 16.25 ft. x 16.25 ft.). An adjacent orchard spaced 7 x 7 meters = 22.75 ft. x 22.75 ft. was adequately spaced. The shading was reducing fruit production by as much as 50% through the loss of production lower in the trees and from black scale problems. Attempts at pruning the trees in the closer spaced orchard, to maintain tree size, were unsuccessful because the excessive pruning caused the trees to become more vegetative and much less productive. The conclusion was that trees must be properly spaced according to variety, soil type, and climate knowing the ultimate vigor of the orchard and size of the trees.

Olive fly is not a significant problem in Tuscany in most years since the insect is not favored by the climate compared to other parts of Europe. The orchards are either sprayed once with an insecticide (Dimethoate) or Eco-traps are used in the organic orchards.

The primary varieties grown in Tuscany are:

- Frantoio: The principle cultivar that epitomizes Tuscan style olive oil. It is extremely fruity in character, ripens mid season, is cold sensitive, somewhat self-fruitful, but does better with cross-pollination, especially under adverse weather conditions during bloom. Frantoio oil has an odor of fresh fruit or fresh vegetables such as artichoke. It has an average piquancy, average viscosity, is slightly astringent, and has a long lasting finish in the mouth.
- Leccino: A principle Tuscan variety and one of the most widely planted varieties worldwide. Heavy producer, comes into production early, early ripening, produces milder oil with particular flavor characteristics. Self-sterile – requires cross-pollination, medium oil content, very cold

tolerant, very productive with an easy fruit removal force.

- Maurino: A variety used primarily for pollination yet is self-sterile. It is a cold hardy variety with a medium polyphenol content used primarily for blending to soften excessively strong oils.
- Pendolino: A variety used primarily for pollination yet is self-sterile. Productivity is high, constant, and the fruit ripens mid season. The fruit has a low oil content and is used primarily for blending. Cold hardy.
- Moraiolo: An old variety that is very hardy and productive. It is self-sterile. It has high oil content of particularly fruity taste with a high squalene and polyphenol content.

**Olive oil Tasting with Marco Mugelli:** That evening we had an opportunity to taste several California and Italian olive oils with Marco Mugelli, a local taste-panel head, along with two of his taste-panel members.

Steps in tasting olive oil:

1. Smell and taste the oil only after it has reached body temperature (98°F).
  - a. Vegetable world? (yes or no)
  - b. Ripe or Green?
2. Put some oil on the tip of your tongue and observe if there is any sweetness evident (sweetness like almonds & pine nuts).
3. Spread the oil to the back of the tongue and suck in air to volatilize the oil quickly.
4. Close your mouth and breathe out through your nose noting the smell of the oil.
5. Swallow the oil and note the degree of piquancy in the throat and bitterness on the rear of the tongue.

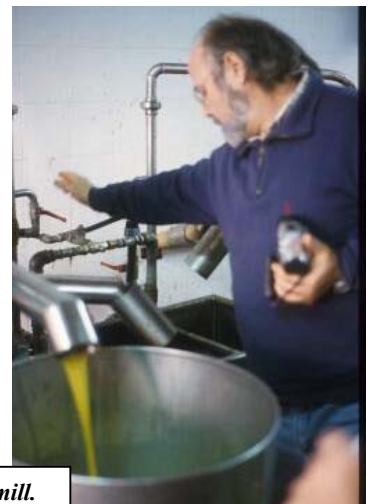
**Dinner at Ristorante Carmagnini del '500 at Ponte nuovo di Calignano**

- Trota Salmonata with a Frantoio/Leccino blend oil
- White beans and bread with a Leccino/Pendolino oil
- Ribollita with Moraiolo oil
- Beef cutlet with mixed cultivar olive oil
- White beans with Frantoio olive oil
- Pine nut – chestnut flour pie & coffee
- Prosecco Valdobriade Brut – Col dei Salici
- 1999 Vernaccia di San Gimignano Casale-Falchini
- 1998 Chianti Colli Fiorentini, Castello Il Corno
- 1997 Vino Nobile di Montepulciano, Fattoria del Cerro
- Vin Santo – Antica Fattoria Machiavelli

It was noted that while most of the California oils, which we brought with us, were legally “Extra Virgin” oils they were inferior to the Italian oils we tasted. Many of the California oils had been over-worked in the processing either with excess milling to a very fine paste or lengthy malaxation that had extracted some of the fruity character and left the oils bitter, pungent, and unbalanced.

### TOSCANA - Experimental Oil Mill – Castello Il Corno Mill

**Sante Dame Experimental Mill:** We had a very rare opportunity to see research in action when we spent the morning with Marco Mugelli and his team of University and local producers working to fine tune their olive oil production quality. They feel they have excellent varieties that produce the flavor components they want in their oils and they have already done about as much as they can with very precise harvest, the maintenance of fruit quality, immediate processing, and impeccable sanitation in processing and oil storage. They do have several questions, however, related to the effects of fruit maturity, the fineness of milling for the paste, oxygen exposure throughout oil processing, differences in the amount of water added in the 2 or 3 phase decanters, and blending various oils into the



Marco Mugelli at the Sante Dame mill.

desired composition.

The day we were there, they were studying the quality effects on olive oil between:

1. Malaxation with oxygen exposure – conventional method
2. Malaxation without oxygen exposure in a new vertical malaxator
3. Separation of phases in a decanter with the addition of water
4. Separation of phases in a decanter without the addition of water
5. Harvest maturity comparing the fruit from the same four orchards over a four week period

They had already completed experiments comparing oil made from a stone mill, hammermill, and the new disc mill fruit grinders. They were collecting samples of both paste (frozen in liquid nitrogen) and oil for later evaluation. Temperature of each phase of the processing operation was carefully monitored to make sure each batch of fruit was treated the same. Marco Mugelli has been a pioneer researcher in Italy regarding olive oil quality. He was the first person to demonstrate the positive effect in maintaining higher polyphenol levels by using fresh fruit-water recently extracted from a 3-phase decanter as the water injected into the paste of a 3-phase system instead of using fresh water. He calls this system the 2 ½ phase system. Many people are now using it.



*Left: Stainless steel vertical (no oxygen) malaxator. Right: Traditional malaxator*

The oil samples taken the day we were there are stored for various time periods, then evaluated by a select taste panel of experts. After all, the real decisions as to the choices made for harvest maturity and processing methods must be evaluated by the oil taster. The primary difference in the results in these experiments is that the conditions were carefully controlled in order to eliminate variability caused by fruit quality or processing methodologies that tend to lead toward bias in “experiments” conducted by private producers. Differences must also be observed for more than one year in order to be meaningful. If they do reveal real differences and benefits, for example, in the oils produced in the malaxators without oxygen exposure, it is likely that the machines would become standard equipment.

#### ***Lunch at Ristorante L' Albergaccio***

- Bruschetta appetizer (thick toast with olive oil & mushroom paste)
  - Arugula salad with radicchio, prosciutto, & salame
  - Pork –rabbit sausage
  - Chicken – guinea fowl sausage
  - Fettunta all' arrabbiata pasta
  - Biscotti
  - 1999 Bianco di uve nere Caniolo/PN– Machiavelli
  - 1996 Conti Serristori Riserva – Chianti Classico
  - 1998 Chianti Classico – Antica Fattoria Machiavelli
  - Vin Santo – Conti Serristori Santelmo
- Dinner in Firenze – Il Cibreo*
- 1999 Bianco di Custoza La Prendina
  - 1998 Conte della Vipera – Antinori
  - 1998 Chianti Classico Riserva Castello dei Rampolla
  - 1995 Sammarco – Castello dei Rampolla
  - 1997 “IL” Vignaioli di S. Stefano Moscato Passito

***Il Corno Mill – San Casciano:*** At the Castello Il Corno, Maria Giulia Frova, the owner, gave us a tour of the mill. She described their Alfa Laval equipment including the machine that washes the fruit, hammermill and disk mill, malaxator, 2 ½-phase decanter (uses recycled fresh fruit-water containing polyphenols in the 3-phase machine), and storage facility. They still have some of the old original orci (large ceramic vessels) for oil storage in a cave-like storage area. While tourists are led to believe that these



*Il Corno in San Casciano*



are still used, we were shown modern stainless steel tank storage area, which was state of the art.



*Leccio del Corno fruit*

They have an interesting variety that they use with the traditional regional Frantoio-Leccino-Pendolino mix, which is the cultivar Leccio del Corno - a selection by the Il Corno Estate due to its resistance to cold. The variety produces good oil quality, is self-compatible, late maturing, with little alternate bearing, and has good production.

## TOSCANA – I Bonsi Estate Laudemio – Frescobaldi Laudemio

**Budini Gattai Family – I Bonsi Estate:** On Sunday morning we traveled by motorcoach to the I Bonsi Estate villa near Regello. We were given a tour by several members of the immediate Budini Gattai family and observed the processing of olive oil with the old traditional press system. The fortified villa buildings were originally built in the 1200's and modified in the 1400's and 1800's. The ancestors of the estate were farmers who had a strong relationship with the tenant workers on the property. The villa was



*I Bonsi Estate Villa*



*I Bonsi Estate high density orchard*

created for mutual protection and support. The farm today occupies 1,560 acres. Since agricultural income is insufficient, some of the buildings have been modified for agritourism, which supplements and supports several families with modern lifestyles. It includes a museum of their old stone mill and wooden screw press. The rural setting is very quiet and peaceful.

The olive orchards include 16,000 olive trees, 9,200 of which are closely planted in an intensive system. We heard grumbling that the intensive system orchards yield the same as traditionally spaced larger trees, but the oil content of the fruit is about 2% less. They like the

intensive orchards, however, for ease of harvest and more rapid return on investment. The variety make-up for their Laudemio production is 60% Frantoio, 30% Moraiolo, and 10% is the Leccino variety. They also produce oil for their second label. They currently employ 6 full time farm workers plus seasonal help for harvest and pruning.

The fruit is brought into the mill in small plastic lug boxes and worked almost immediately. The olives are primarily crushed with a stone mill though there was also a hammermill operating while we were there. The current system used for oil extraction is a set of three hydraulic presses that are kept working continuously by a mechanical robot that loads the press cake cylinders. They told us that the stones are used for 7 minutes to crush the fruit,

### *Lunch at Ristorante Ci Sei*

- Antipasti – head cheese
- Sbricciolona (soft salame)
- Local bread
- Risotto with funghi porcini (parboiled rice)
- Tagliata with rucola
- Biscotti & coffee
- Budini Gattai Vino Rosso (bulk house wine)
- Sangiovese Vdt – Bricciolona
- 1996 Pomino Rosso – M de' Frescobaldi
- 1996 Nipozzano Riserva – Rufini– Frescobaldi
- 1992 Ponte alle Gazze
- Vin Santo – Tenuta di Bonsi



*I Bongi Stone mill*

processing season starts, they operate continuously (24 – 7) until finished. Their press mats are not reused from year to year. They have three workers operating the mill.

malaxation occurs for 15 to 35 minutes, loading the press cake takes 14 minutes and pressing (at 400 ATM. pressure) lasts 55 minutes. The paste is warmed to about 85°F in the malaxation process. Once the



*I Bongi robotic press - cake loading machine*



*I Bongi presses*

**Frescobaldi  
Residence – Firenze:**

Before dinner that evening, we were invited to meet with the Marchese Frescobaldi and his family for an aperitif and discussion regarding the origins of the Laudemio marketing group. We were treated to some of their fine wines and candied chestnuts while seated in their

living room admiring the life size portraits of the ancient Frescobaldi's. The Laudemio term is an old Italian word used for the feudal tribute owed to the overlord, which naturally consisted of the best part of the crop. It was used to evoke tradition, nobility, and prestige for the best portion of an olive oil harvest. The Laudemio brand and group was developed in 1990 by the Central Tuscan Oliveculture Consortium with the impetus of the Frescobaldi family.

The cooperating 30 members in this Central Tuscan region have over 5,000 acres of olive cultivation and some of the world's most remarkable old villas and estates. Laudemio came into being due to the following self-imposed set of regulations:

1. Oil comes only from the Central Tuscan Hills.
2. Orchards are classified by soil type, variety, tree age, planting system, and cultural techniques.
3. The entire production cycle from cultivation to bottling is monitored for conformity & quality.
4. Specific rules govern: date of harvest, limitation on the time period between harvest and processing, and cold pressing according to precise technical specifications.

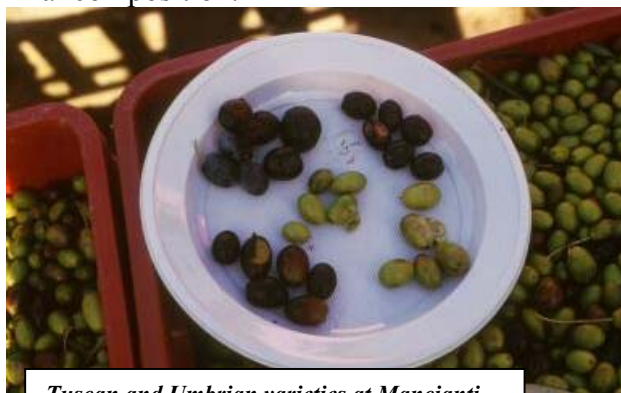


*I Bongi Laudemio oil and 2<sup>nd</sup> estate label oil*

The Laudemio brand has successfully brought olive oil out of obscurity and into a new light. It is generally regarded as one of the best oils of the world and commands a very high price. The consortium of producers came together to create something unique in an effort to set their product apart from other producers. This may be an interesting model for California producers in the future.

## UMBRIA – Mancianti Mill - Faena Estate – Lungarotti Museum

On Monday morning we traveled south from Florence to the shores of Lago Trasimeno and the mill of Alfredo Mancianti (Frantoio di San Feliciano). This mill produces regional D.O.P. (Denominazione D'Origine Protetta) Umbria oil specifically from the varieties Frantoio and Leccino 65%, Dolce di Agogia 15%, Moraiolo 10%, and other varieties 10%. The DOP oil was well balanced and harmonious with a light fruitiness, fresh almond and artichoke flavor. The blend is made primarily in the field, but since varieties mature at different times, each lot of fruit fills a different stainless steel storage container. These are later blended in different concentrations for the final composition.



*Tuscan and Umbrian varieties at Mancianti.  
8 o'clock = Moraiolo, 10 o'clock = Dolce di  
Agogia, 2 o'clock = Leccino, 4 o'clock =  
Frantoio, center = Pendolino.*

Dolce di Agogia: An antique regional variety that is very precocious and early ripening – before Leccino. It produces very sweet oil with a walnut-like flavor that has little or no bitterness or pungency. Its primary purpose is to mellow out other stronger varieties in a blend. It is self-incompatible, very resistant to cold, and is sometimes used for dried black olives.

The Mancianti mill was very impressive for its cleanliness and attention to detail in fruit handling.

All of the fruit entered the mill through the second floor via a conveyor belt system that moved 30 kilo (70-lb.) plastic lug boxes. The fruit was carefully sorted by variety, grower, quality, and weight.

The Alfa Laval mill used a water spray system to clean the fruit so that it was not contaminated by dirty water. Alfredo Mancianti had recently installed a disk mill and was very impressed with how it provided a softer oil than fruit milled in a hammermill. His malaxator operated at a paste temperature of 76°F with a water jacket temperature of 90°F. He had two malaxators and mixed the fruit in the first for 15 minutes and 20 minutes in the second. The system used a 2-phase Alfa Laval decanter that had a capacity of 1,200 kilos (2,600 lbs.) of fruit per hour. All of his oils were stored in stainless steel tanks.



*New Mancianti disc mill*

**Faena Estate and Nursery – Prof. G. Fontanazza:** We had a wonderful lunch at the Faena Estate orchards and home of Sebastiano and Alessandro Faena in Monte Castello di Vibio. We were also hosted by Professor Giuseppe Fontanazza of the Perugia Institute of Research on Oliveculture.



*Shaker harvest at the Faena Estate*

In the fields we observed mechanical harvest using a combination of mechanical shaker/vibrator machines followed with supplemental combing with hand held air-powered combs. A crew of men spread nets under several trees in a row. A shaker mounted on a small caterpillar tractor then locked onto the trunk of each central leader tree and shook it for about 5 seconds. Fruit removal on some trees was almost

complete, but on others it was estimated to be only about 60%. The fruit that came off was more mature and had greater color. The shaker was followed by two men using hand held air-powered combs, which they used to knock the remainder of the fruit down onto the nets. Another group of men lifted the nets and dumped the olives into plastic lug boxes. When those nets were clear of fruit they were then spread under the next group of trees in order to keep the shaker going continuously.



*Right: shaker harvested fruit – more mature.  
Left: greener fruit removed with combs.*

We also observed the pruning of a 14-year-old central leader olive tree, which took about 10 minutes. The pruner trimmed the lower skirts from the ground, so that the shaker would have unencumbered access to the trunk. Then on a ladder, he trimmed out several 1/2 to 3/4 inch diameter branches at their point of attachment to the central leader, mostly in the upper part of the tree. The tree was about 14 ft. tall and spaced about 20 ft. x 10 ft. in the orchard. The finishing touches included some under-cutting and removal of smaller branches that had fruited the year or two before and had become pendulous. With 229 trees per acre it would take about 38 hours to prune an acre such as this. To the untrained eye, the tree looked almost identical before and after pruning; there were only subtle differences.



*Pruning a mono-cone tree at the Faena estate*

According to Professor Fontanazza's work on high density plantings and training systems, it is possible to shorten the time period for new trees to come into bearing, to attain constant and higher yields, to produce excellent quality fruit and oil, and to reduce costs through mechanization of harvest and pruning. In his work with high density irrigated orchards planted at approximately 19.5 ft. x 9.75 ft. (6 x 3 meters), labor was reduced from 80 hours/acre (hand harvest) to 23 hours/ acre for mechanical harvest by trunk shakers. Labor was further reduced from 30 hours/acre for hand pruning to 5.5 hours for

mechanical pruning. His mechanical pruning system is based on a three year cycle where in the first year the trees are hedged on both sides mechanically, the second year the trees are left unpruned, and in the third year the trees are quickly hand pruned to remove specific branches that have grown too large. Third year pruning is what we observed in the demonstration.

The Perugia Institute of Research on Oliveculture has also been conducting olive breeding work to develop dwarfing rootstocks and low vigor cultivars in order to reduce olive tree size and vigor. The idea is to plant the trees very close together (900 trees per acre) and harvest the fruit with an over-the-row straddle harvester. The straddle harvester offers an even greater potential to reduce costs since it is a continuous moving machine. The Gregoire Company in Italy developed the first straddle harvester in 1999. Some success has been achieved with the release of the Fs-17 rootstock and I-77 dwarf cultivars.

- Lunch at the Faena Estate***
- Local salami
  - Ceci bean soup
  - Local table olives
  - Bruschetta (toasted bread covered in olive oil)
  - Local red wine – Vinicoltori Coop
- Dinner Le Tre Vaselle in Torgiano***
- Zucchini blossoms stuffed ricotta cheese
  - Cherry tomatoes sautéed with wine & black olives
  - Triangles of pasta stuffed with artichokes
  - Fillet of beef with balsamic grape sauce
  - Roasted potatoes with rosemary
  - Vin Santo with raisins marinated in grappa
  - 1999 Torre di Giano
  - 1997 Rubesco
  - 1990 Riserva Monticchio

Professor Fontanazza showed us a variety block planting that included the following varieties:

Giarraffa: The classic large fruited table olive of Tuscany and Umbria. It comes into bearing early, is partially self-compatible, productivity is low and alternate, and it has low oil content.

Fs-17: One of Prof. Fontanazza's dwarf varieties that serves as a dwarfing rootstock for Giarraffa and Ascolana Tenera. When used as a cultivar itself, it is very precocious and self fruitful. The oil is quite mild in flavor and used mostly for blending.

Don Carlo: Prof. Fontanazza's dwarf variety named after his father.

L-77: Prof. Fontanazza's dwarf variety used in intensive plantings. It is self-fruitful, very precocious and has high oil content with good quality.

DA-12 I: A verticillium resistant variety that is used as a clonal rootstock.

Kalamata (Kalamon): A Greek table variety with a distinctive shape and proven quality. It also produces good oil. This variety is being widely planted in Australia and is being studied in Italy as a dual-purpose fruit. It ripens late, is highly productive, alternate bearing, and cold resistant.

**Lungarotti Museum**: One of the best olive oil and wine museums in the world is located in Torgiano at the conference center of "Le Tre Vaselle" just south of Perugia. It was established by Giorgio and Maria Grazia Lungarotti as part of their Museum of Wine. It includes several rooms with numerous collections of ceramic oil storage vessels, antique processing equipment, antique oil lamps, and historical – technical – and ethnographic depictions of olive culture over the last 500 – 1,000 years. It includes an interesting botanical family tree of the lineage of the modern olive cultivars and their route of dispersal throughout Europe and Northern Africa.



*Giarraffa fruit*



*Ancient olive oil screw press*

## TOSCANA – Sonnoli Nursery – Mansi Bernardini Estate – University of Pisa

**Sonoli Nursery**: From Florence we traveled westward toward the coast and stopped at the Sonnoli Nursery in Pescia. The nursery was one of the primary sources of genetic material for California producers because it was one of the first nurseries to introduce new cultivars into California in the early 1990's. Attilio Sonnoli is slowly turning over his nursery operation to his two sons - Alberto and Stefano. The nursery uses classical propagation techniques that include dipping cuttings in rooting hormone, bottom heated beds filled with perlite, and periodic misting of cuttings until rooted.



The nursery has several specific clones of various varieties that have been selected for superior performance including a clone of Leccino called Minerva. They also have two compact varieties called Urano and Diana that are being evaluated for super high-density plantings and over-the-row harvesting.

*Attilio Sonnoli holding an empty propagation flat that, when in use, is filled with perlite and olive cuttings*

**Mansi Bernardini Estate:** We met with Marcello Salom near Lucca at his Agritourism Farm-Estate that has 12 houses for rent, two swimming pools, and 2,500 olive trees. We walked through this very beautiful property set in the rolling Tuscan hills that is surrounded by forest and various types of mixed agriculture. The old buildings and setting were very romantic. After lunch we observed harvest from his new orchard that was planted in the late 80's. He has planted Frantoio, Leccino, Maurino, and Pendolino trees in proportion to what he had prior to a freeze in 1985 that killed 40% of the trees and stopped production for 5 years.



*Harvest at the Mansi Bernardini estate using air-powered combs*

The trees were being harvested with hand held air powered combs similar to the system we observed earlier as a supplement to tree shaking. Nets were first spread under the trees while two men removed the fruit with the combs. We all tried our hand at it and observed that the fruit on all of the varieties came off quite easily and quickly. The fruit was gathered up from the nets and processed at his neighbor's mill. We tasted the oil during lunch and it was superb.

**University of Pisa:** Late in the afternoon we attended a special lecture by Professors Riccardo Gucci and Claudio Cantini at the University of Pisa regarding olive tree pruning and training. The University of Pisa was established in 1843 and still has a strong commitment to science. These two researchers have recently written the definitive book on olive pruning from their own practical experiences, field research at the Folorica research station - 120 miles south of Pisa, and review of scientific literature on the subject. The title is "Olive Pruning and Training Systems for Modern Olive Growing" and is available at <http://www.publish.csiro.au>

Traditional olive production systems are characterized by low productivity, old widely spaced trees (36/acre), part time farming on small acreage, high labor costs, and little mechanization. This system is romantic, but truly not profitable, so the push has been toward larger plantings of higher density irrigated orchards that are planted about 70-200 trees per acre. These orchards are mechanically harvested and require specific tree-form training.

**Lunch at the Mansi Bernardini Estate**

- White bean vegetable soup with croutons
- Open fire grilled toast covered in olive oil
- Bacalla ai ferri (grilled stockfish)
- Chocolate, lemon, and sweet vegetable torte (Torta coi Becchi)
- 1999 Valgiano Palistorti red wine (80 % Sangiovese, 10% Syrah, and 10% Merlot)

**Dinner at La Mora in Lucca**

- Trout filet with white beans
- Vegetable custard
- Ravioli alla maggiorana
- Artichoke in garlic sauce
- Semi freddo dessert (specialty of Lucca)
- 2000 Ferrari brut
- 1998 Vasario Bianco – Buonamico
- 1996 Cercatoja Rosso – Buonamico
- 1996 Il Fortino – Buonamico
- 1999 Moscato d'Asti la Caudrina

They found that the highest density possible today for olives is about 4 x 6 meters or 13 ft. x 19.5 ft. because there are no proven dwarf varieties and all olive trees eventually get big. When attempts are made to keep them small with heavy pruning the trees respond by going vegetative and produce little fruit. Spacing that is too close on overly vigorous trees creates shading and poor production problems. They found that the bush or vase shaped tree form is the best training system because it is easier and less costly to maintain, while providing similar or even better production results compared to other systems. Their work also indicates that pruning every other year rather than every year works very well.

## LIGURIA – Romanengo Candy Factory - Taggiasca Harvest – Isnardi Processing Facility

**Romanengo Candy Factory:** The following day we traveled north through Genoa and stopped to see the Romanengo family candy factory. Pietro Romanengo whose family has been making fine candies for over 200 years gave us a tour of the small, candy-making kitchens. They make hundreds of confectionery treasures that were very interesting to see and taste. They use a small stone olive mill to grind up cocoa beans and then they mix the raw chocolate for several days to get it smooth. We observed the process used to make candied fruit, one of their specialties. They take whole fruit and submerge it in a hot sugar - brandy syrup for several weeks until it becomes completely saturated with the syrup. We tasted candied mandarins, kiwi, figs, loquats, plums, and apricots.

**Taggiasca Harvest:** After lunch we met with Pietro Isnardi and his family to experience olive oil production in Liguria. The principle variety grown in Liguria is Taggiasca, which is an interesting



Harvesting Taggiasca olives

localized variety that has been growing in that region for several

hundred years starting with the Benedictines around 1200. It produces fruit that matures early on an upright form tree. It is self-fruitful and is rarely interplanted with pollenizers. The fruit is typically harvested fully mature (black) by knocking it down off the trees with long poles onto nets spread under the trees. We observed several men climbing in the trees, swinging long poles, and hand shaking smaller diameter branches high up in the trees.

The orchard we visited was in a beautiful setting up in the steep terraced limestone hillsides. The trees were very tall and spaced too close together. Most of the fruit was located in the tops of the trees, which made it more difficult to remove. We were told that the typical orchard is only about 2 acres in size since the land was passed down to heirs and divided up over many generations. The trees we saw were pruned about every 5-

7 years with fairly heavy cuts

that periodically rejuvenate the trees.

**Isnardi Processing Facility:** Back in Pontedassio near Oneglia, we were hosted by Pietro Isnardi, who gave us a tour of their museum, mill, oil storage and blending tanks, and tourist shop. The Isnardi family started out in the oil business in 1908 and got involved in the use and sale of vitamin fortified olive oil as a health product. A few years ago they purchased the Ardoino label and storage facilities. Over the years they have produced consistently superior olive oils typical of the Ligurian area.

### Lunch at La Barlocca in Genoa

- Pasta with white sauce & walnuts
- Gnocchi pasta made with chestnut flour & pesto
- Cappon Magro
- Pickles vegetables
- Stock fish alla Genovese
- Apple torte & creme made without flour
- 1999 Golfo del Tigullio Bianchetta – Bisson
- 1999 Golfo del Vermentino – Bisson
- 1999 Riviera Ligure Ponte Pigato – Bruna
- 1999 Riviera Ligure Ponte Rossese – Bruna
- 1999 Golfo de Tiguillo Roso Mùscato – Bisson
- 1999 Moscato d’ Asti – F.lli Bera

### Dinner in Imperia – Lanterna Blu da Tonino

- Ligurian tempura of vegetables in olive oil
- Giacchetti (baby white bait with mashed potatoes)
- Pennete pasta with sauce of baby cuttlefish
- Dentice fish
- Various cheeses (gorgonzola - grana parmesan – aged pecorino)
- Semi freddo – frozen custard/mouse
- Prosecco di Valdobiadene Rustico – Nino Franco
- 1999 Riviera Ligure Vermentino – Isnardi
- 1999 Riviera Ligure Pigato – Isnardi
- Rosse di Dolceaqua – Ardoino – Enzo Guglielmi



Taggiasca fruit



They currently purchase several different oils from other Mediterranean countries that they manipulate and blend to produce a mild flavored product. They also purchase oils from Abruzzo, Puglia, and Sicily that they blend into stronger flavored oil compositions. They market their oils worldwide.



*Isnardi pitter machine*

One of the most interesting innovations was a machine, recently installed at their mill that mills the fruit while removing the olive pits – the olive pitter. We observed two lines of fruit moving into the processing plant from the same source of recently harvested Taggiasca fruit. One line was milled with a traditional stone and the other was pitted. Each line had its own separate malaxators where we could observe a clear difference in the color of the paste from pitted and non-pitted fruit. The paste of the pitted fruit was greener and less oxidized. In another line the pits themselves were being processed for cosmetic oil.



*Paste from pitted fruit on the left is lighter in color – less oxidized than paste on the right from fruit milled with the pits*

Most of the Isnardi – Ardoino oils are unfiltered, but for those that are filtered, they use a diatomaceous earth (DE) filter that blends DE with the oil in a small tank before pumping the oil through a fine paper medium that captures the DE and any impurities in the oil.

DE and any impurities in

### LIGURIA – Olio Carli and Carli Museum

**Olio Carli:** The Olio Carli operation has a large processing facility that is visible from the outside via large windows. When we were there the weather was very nice so the windows were open and we could see, hear, and smell the oil being made. The facility is designed as a show place for tourists. Many tourists visit the mill each day where they can take a self guided tour and watch the modern machinery process olives into olive oil.



*Carli product brochure with return mailer*

A unique aspect to the Olio Carli Company is their marketing system. Their oil is not sold in any stores. Orders are placed by phone, Internet, or by mailing in a card that is read by computer as to the selections indicated. The oil is then delivered directly to the customer’s house or business anywhere in the country in an Olio Carli truck. They also sell wine, table olives, olive paste, tuna, vinegar, and soap via the same direct delivery service. The company sells both extra virgin olive oil and olive oil in several different types and sized of bottles for home and institutional use. The Olio Carli Company purchases local Taggiasca olives and fruit from various other parts of Italy and Mediterranean countries to produce a wide spectrum of products in various prices and quality ranges.

**Olio Carli Museum:** Right next to their processing facility is the Olio Carli Museum which receives over 30,000 visitors each year. It was officially opened in 1993 and is a combination of the Carli family's private collection and many government donated pieces. It received an award for Museum of the year in 1993 and provides a very effective historical presentation of the olive tree and olive oil culture.



*Huge lever press at the Carli Museum*

***Lunch at the Isnardi Processing Plant***

- Antipasti - Tuna in olive oil, stuffed hot peppers, & dried tomatoes in olive oil
- Brandacojon – stock fish with oil and potatoes
- Farinata – garbanzo flour bread
- Trofie al pesto
- Dentice reale & salmon (roasted)
- Chocolate gelato
- 1999 Riviera Ligure Vermentino – Ardoino
- 1999 Rossese di Dolceacqua - Ardoino

***Dinner at the restaurant San Giorgio in Ceva***

- Baby white bait
- Farinata
- Dentice – white fish
- Gnocchi with shrimp
- Chocolate mousse
- Prosecco Spumante Brut – Angoris
- 1997 Arbarei – Ceretto
- 1999 Riviera Ligure - Isnardi

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