

**ORGANIC GRAPE AND WINE PRODUCTION:
GROWER EXPERIENCES IN GERMANY**

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1. INTRODUCTION

First, I would like to show you the basis of the wine production in the European Union (EU) and Switzerland in comparison to the U.S.A. (Table 1).

In the European Union (EU) organic grape and wine production is governed by EU order number 2092/91 of June 24, 1991 which regulates organic agriculture. It details acceptable methods for the production and labeling for products of ecological organic agriculture. They apply to all member countries of the European Union. On the basis of these directions, special federations or unions for organic viticulture have made guiding rules for their practical application.

Wines produced under these EU directions must be named with the following terms:

English Organic
French Biologique
German Ökologisch
Greek βιολογικος
Italian Biologico
Spanish Ecologico

2. ORGANIC VITICULTURAL AREAS

The size of organic viticulture operations differ greatly among the EU member countries which cultivate grapevines.

In Italy, the number of organic growers is not known.

Table 1. Grape Production in the European Union (EU) and Switzerland in comparison to the USA

Country	Acres (1000's)	Wine Production 100's hectoliters	Wine Consumption gallons/person
Austria	139.2	2588	8.5
Belgium	–	2	5.4
France	2263.2	65,401	16.6
Germany	256.8	13,400	5.9
Great Britain	2.4	26	3.2
Greece	331.2	4,050	8.1
Italy	2419.2	68,686	15.6
Luxembourg	2.4	272	15.4
Netherlands	–	–	4.3
Portugal	888.0	7,555	14.2
Spain	3264.0	37,036	10.1

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In France, 2,938 ha (0.3% of the total 943,000 ha of vineyards) are grown organically.

In Germany, about 330 enterprises cultivate an area of about 1,316 ha in organic production. This corresponds to 1.2% of the total vineyard area of Germany. The most progress in organic viticulture has been achieved in Baden, the region which neighbors Switzerland to the southeast and Alsace to the west. In Baden 105 farms and cooperatives produce organic wines on 350 ha, (2.2% of the 16,000 total ha cultivated in Baden).

In comparison with the organic viticulture in Germany, the integrated production has progressed to a more ecological form of viticulture, the so-called “controlled environmentally protecting viticulture.” With exception of the permitted use of organic fungicides, for the most part this type of grape production is similar to organic viticulture. Organic production is based on a mental attitude to a holistic world.

3. BASIC RULES OF ORGANIC VITICULTURE

In Germany, five organic producing unions exist. Of these, the Bundesverband Ökologischer Weinbau - Federal Association of Organic Viticulture (BOW) is the largest and unique in that only grape-wine producers can be members. In Figure 1 you will find the names, year of the foundation, trade name and trademark, along with the number of enterprises and size of the viticultural area of the German organic associations.

The BOW was founded in 1985 with the goal to represent and to lobby all organic grape growers in Germany. BOW also organizes events such as shows and specific fairs for presentation and sale of organically produced wines.

In 1985 the first national rules for organic grape production were proposed by the BOW, amended in 1989 and 1992. The rules give

Figure 1 Der ökologische Weinbau in der Bundesrepublik Deutschland (Stand: 01.01.1994)					
	biol. - dynamisch	organ. biologisch	Naturland	BOW	Gää
Gründungsiahr	1924	1971	1982	1985	1989
Warrenname und Schutzzeichen	“Wein aus demeter Trauben”	BIOLAND	NATURLAND	ECOVIN	GÄA OKOLOGISCHER LANDBAU
Anbaufläche (ha)	31.73	182	109	ca. 990	3.5
Zahl der Betriebe	25	53	17	ca. 234	1
Adresse der Anbauberater	Forschungsring für Biol. - Dyn. Wirtschaftsweise c. V., Demeter-Bund Baumschulenweg 11 D-64295 Darmstadt Tel. 06155-2674 Fax 06155-5774	Bioland - Verband für organisch-biologischen Landbau e. V., Nördliche Ringstr. 91 D-73033 Göppingen Tel. (07161) 910120 Fax (07161) 910127	Naturland Verband für naturgemäßen Landbau e. V. Kleinhademmer Weg 1 D-82166 Gräfelting Tel. 089-8545071 Fax 089-855974	Bundesverband Ökologischer Weinbau e. V. (BOW) Zuckerberg 19 D-55276 Oppenheim Tel. 06133-1640 Fax 06133-1609	Gää c. V. Vereinigung Ökologischer Landbau Plauenscher Ring 40 D-01187 Dresden Tel.0351- 4012389 Fax.0351- 4012389

general and specific directions in the field of cultivation techniques, soil treatment, plant protection and vinification.

The objectives of organic grapevine cultivation are:

1. Conservation and raising the natural soil fertility by suitable cultivation procedures, but also omitting all measures which are contradictory, such as the use of synthetic fertilizers;
2. Cultivation of healthy resistant plants without any application of herbicides, insecticides and organic fungicides to avoid the dangerous counter-regulations from the ecosystem;
3. Use of raw materials and waste products which do not contain pollutants and extensive use of a product recycling;
4. Reduction of stress and contamination for water and soil, e.g. by nitrate, phosphate and pesticides;
5. Advancement and increase of species diversity of plants and fauna in the vineyard ecosystem;
6. Rejection of gene-manipulated plants, e.g. grapevines or green plants;
7. Organization of a reliable livelihood on the basis of satisfactory living conditions.

4. PHASE OF CONVERSION

The conversion of a vineyard from traditional to organic production needs an approved schedule of 3 years at most, during which time, the whole enterprise must be converted. In the meantime, marketing is possible, but only with the reference “in conversion.” Three years after the conversion, the enterprise obtains a contract of admission with a registration number, under

which the wine can be marked with the trade mark label ECOVIN.

5. CULTIVATION DIRECTIONS

Following directions for organic grapevine cultivation is obligatory for BOW members:

Soil Management

1. Fundamental green cover for all vineyards is necessary for soil maintenance, soil loosening, resowing. During dryness in summer and in young vineyards after planting, the green cover can be unbroken for a maximum of three months. Green cover may consist of natural flora or be a specially sown green cover variety mixture.
2. The application of herbicides is forbidden. Management of the green cover mulch is especially important during dry periods.
3. The use of synthetic nitrogen and soluble phosphate are forbidden. The recommended organic manures and composts as well as the mineral additives are listed in Table 2.
4. The natural structure and fertility of the soil has to be considered with all soil cultivation methods. All must be done carefully and at the right time. Avoid soil-turning.

Pest and Disease Management

The application of chemical - synthetic insecticides, miticides and organic fungicides is forbidden. The permitted products for plant care and protection are listed in Table 3.

In Baden we use the following guidelines to regulate and control the most important grapevine pests and diseases:

Inorganic copper (copperoxichloride) and sulfur are used against downy and powdery mildew. The amount of copper is limited to 3 kg active

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Table 2. Soil improving compounds and manures permitted for organic viticulture.

Organic Manures and Composts

- * animal manure (composted in stacks or bigger areas)
- * chicken manure
- * abatoir affal (horn, blood, bone meal, feathers, bristles)¹
- * seaweed flours and extracts
- * composts from biological scraps (home and greenery scraps)²
- * harvest residues and waste from wine making
- * plant manure
- * straw
- * bark compost (mulch cover)²
- * organic manures¹
- * bio-dynamic compost and spray preparations

Mineral Manures (additives)

- * rock, clay material
- * lime, seaweed lime
- * rock/phosphate, basic slag¹
- * potassium, potassium sulphate¹

¹ possible only after soil analysis

² heavy metal and pesticide residue analysis is required

copper ingredient by hectare and year. To support these products, plant preparations and/or mineral products can be added. Excoriose (*Phomopsis viticola*) and rotbrenner (*Pseudopeziza tracheiphila*) (similar to angular leaf scotch) are also treated with these products. To prevent and reduce grey mold, which is not as frequent nor dangerous due to the renunciation of synthetic nitrogen fertilizers, the cultivation practice of leaf removal in the grape zone for better drying is practiced.

The most important grape pests are the grape berry and vine moths (*Eupoecilia ambiguella* and *Lobesia botrana*), which produce two generations per year. The first generation attacks the inflorescence and blossoms; the second attack the young berries. Because the application of synthetic insecticides is forbidden in organic viticulture, two alternative procedures are in practice in Germany. The first is mating disruption by use of pheromones. Within the vineyard, 500 pheromone dispensers per hectare are attached to the vines causing a pheromone cloud to arise. Male and female moths are unable to find each other and do not mate. The female lays infertile eggs from which no larval instars hatch. This method was first registered for viticulture in Germany in 1986. Since then,

about 13,000 ha (approximately 50%) of vineyards have been treated with this method, especially in our area. Unfortunately, the mating disruption method is very expensive, e.g. DM 450 - against both grapevine tortricids per ha, less DM 150 - from the government for the control measures, which are necessary for the supervision of the vineyards.

Where the mating disruption method can not be used, a *Bacillus thuringiensis* (BT) product is applied. Presently, seven products with *Bacillus thuringiensis* are registered for use in German viticulture.

Spider mites were another group of harmful pests in German vineyards for a long time. However, protection of the predator mite (*Typhlodromus pyri*) have effectively controlled spider mite populations and they are no longer considered an important pest.

In the past few years weather conditions were favorable for the increased populations of the leaf curl rust mite (*Calepitrimerus vitis*) and warranted control measures. The application of sulfur early in spring immediately after budbreak with weekly repetitions was successful. In summer, the predator mite (*Typhlodromus pyri*) helps to control this pest, too.

In vineyards where no synthetic insecticides are used, many minor insect and mite pests occur; rarely causing an outbreak over the economic threshold.

The number of treatments against the main diseases in organic vineyards (as in traditional vineyards) depends upon weather conditions. The meteorological data were collected by suitable apparatus that gives temperature (min-max), humidity, precipitation and leaf wetness. With these parameters the necessity and timing of fungicide applications can be determined very well so that we are able to limit the sprays to 8-10 per season.

6. ECONOMIC STATEMENT

An economic statement for organic viticulture is just as difficult as for traditional management because it depends on technical equipment and personnel, the number and size of the lots, and so on. A specific study by Kauer (1994) compared the costs of machines and the need of man-hour

per hectare (Table 4) for different procedures in the vineyard. In a comparison to traditional viticulture organic culture has 61% higher machine costs. Concerning the man hours per hectare, a reduction of 4% occurred. Usually, there is a higher machine requirement for organic viticulture, with a greater money input required. At the beginning of the conversion phase, the costs for machines and man hours per hectare are about 20 - 25% more than for conventional production.

One of the most important questions concerning profitability of organic viticulture is yield. Generally, there is a yield reduction of 20 to 25% and most growers experience such a decrease immediately after conversion to organic management. After some years, however, yield returns to previous numbers with a slight decrease of 2 - 5%.

Usually prices for organically produced wines are 10 - 20% higher compared to the prices for integrated or traditionally produced wines.

Table 3. Plant protection products and procedures permitted for organic viticulture on biological, biotechnical, vegetable, mineral and inorganic base.

- * release and protection of auxiliaries (e.g. predator mites)
- * use of auxiliaries (e.g. parasitic wasps)
- * bird protection
- * glued traps
- * pheromones
- * *Bacillus thuringiensis*
- * plant preparations (liquid manures, teas, extracts)
- * quassia wood tea
- * seaweed flours and extracts
- * propolis
- * milk and whey products
- * homeopathic preparations
- * biologic-dynamic preparations
- * water glass
- * rock and clay minerals
- * wettable sulfur
- * inorganic copper preparations (max. 3 kg Cu/ha and year)
- * plant oil (rape seed oil)
- * paraffin oil (free of insecticides)
- * paraffin waxes (free of insecticides)
- * soft soaps
- * alcohol

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Table 4. Machine costs (DM/ha) and man-hours per ha

	Traditional	Integrated	Organic
<u>Machines and Materials DM (ha)</u>			
Machines	2,384 (100)	3,115 (131)	3,389 (161)
Pesticides	641 (100)	530 (83)	821 (128)
(Insecticides)	2%	41%	27%
Manure	<u>191 (100)</u>	<u>273 (143)</u>	<u>413 (216)</u>
Total DM/ha	3,216 (100)	3,918 (122)	5,073 (158)
<u>Man Hours Per ha</u>			
Grapevine Treatment	200 (100)	186 (93)	179 (90)
Soil Management	21 (100)	41 (195)	37 (176)
Manure	3 (100)	7 (233)	9 (300)
Plant Protection	18 (100)	19 (105)	32 (178)
Harvest	250 (100)	250 (100)	215 (86)
Other Work	<u>40</u>	<u>40</u>	<u>40</u>
Total	532 (100)	543 (102)	512 (96)

On the other hand, some subsidies and furtherances for organic production exist. The EU order number 2078/92 from June 30, 1992 makes a maximum subsidy of 700 ECU/ha (about DM 1,000 = \$878 US) available for the conversion from traditional to organic production under the condition that a considerable reduction of fertilizer and pesticides is given. In the German states with appreciable viticulture, different subsidies are available. In Baden, the Market Discharge and Cultural Landscape Compensation Program (MEKA) gives points for specific ecological procedures, such as green cover, renunciation of herbicides, synthetic pesticides and fertilizer, as well as for organic and integrated production. Presently, one point is equal to DM 20 (\$13.50 US). A maximum number of 20 points per hectare or DM 400 can be earned.

7. CONTROL PROCEDURES

The EU order number 2092/91 prescribes a control procedure for organic production. The control refers to the vineyards during the season

regarding green covers and the states of insect pests and diseases. Periodic, chemical analyses of leaves, berries and/or soil samples are performed to guarantee organic production. Enterprises with wine production are controlled during wine processing. On farms, accuracy of required bookkeeping and the nature of plant protection products are also controlled. Fees for a control procedure depends on the size of the vineyard and ranges from DM 150 for 0.5 ha to DM 900 for over 30 ha. This is in addition to a basic rate of DM 100 of which the government pays an amount to promote organic production. A certificate is issued after inspection.

8. WINE PROCESSING

Only grapes processed from organic vineyards can be used for wine making. The first goal must be for a product with high sensory quality, pleasant taste and digestibility.

All processing treatments of grapes, juice, and still or sparkling wines have to follow these regulations:

- Sulfur dioxide should be used only sparingly.
- Methods using base products and energy are to be avoided
- All treatment compounds doubtful in their origins, application or recycling for the environment and health are to be avoided.
- Physical methods are preferred to chemical because of waste avoidance.
- All residues and waste water from processing have to be treated in such a way that they do not burden the environment. Wineries and cooperatives have to prove adequate treatment.
- Only recyclable bottles can be used. Exemptions are granted only if bottles are taken back and used again.
- To avoid waste, the use of caps is not recommended. Caps with lead and tin are not permitted.

The processing and treatment methods permitted for organic wine production is listed in Table 5.

9. PROSPECTS

Organic viticulture is not a complete system, but a movement. Problems are evident in the field of plant protection and soil cultivation.

The use of copper is one critical point, because copper accumulation in the soil is an increasing problem. So, a very intensive search for copper substitutes is one of the most important research fields of responsible institutions. Many products of different origins have been tested in the past, for example rock minerals rich in silicate, water glass, differently activated.

On the other hand, an excellent solution to this problem would be to develop mildew resistant grapevine cultivars. We have 3 to 5 mildew resistant cultivars at our Institute. They have a high resistance to mildews under different location conditions and a good wine quality (the complex origin of the cultivars FR 993-60 and FR 250-75 from 1928 to 1975 is shown in Figure 2).

Within the EU, cultivation of such interspecific cultivars is forbidden, so they can be planted only in small numbers under the inspection of the breeder. Interest of organic growers in such resistant cultivars is not very high. A well known representative of organic viticulture and wine making is reported to have said that, “the breeding of interspecific crossings to create fungus resistant vines, similar to gene technology, is an intrigue and must be rejected as being an artificial product; such plants do not fit into the context of ecological viticulture.” The

Table 5. Prohibited processing and treatment methods and materials for organic wine making and marketing

- * use of microorganisms genetically changed
- * high sulfur addition to sweet reserves
- * chaptalisation of sweet reserve
- * hot bottling of wine
- * blue fining
- * copper sulphate
- * sorbic acid, ascorbic acid
- * PVPP
- * caps containing lead or tin
- * chlorinated natural cork
- * styropor boxes
- * adhesive tapes

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Table 6. Fungicides and insecticides registered and permitted for traditional, integrated, and organic viticulture in Germany

<u>Registered</u>	<u>Integrated</u>	<u>Organic</u>
<u>Fungicides</u>		
Carbendazim	—	—
Copper	Copper	Copper
Cymoxanil	Cymoxanil	—
Dichlofluanid	Dichlofluanid	—
Diethofencarb	—	—
Dinocap	—	—
Dithianon	Dithianon	—
Fenarimol	Fenarimol	—
Iprodion	—	—
Mancozeb	(Mancozeb)	—
Metiram	(Metiram)	—
Penconazol	Penconazol	—
Procymidon	—	—
Propineb	(Propineb)	—
Sulphur	Sulphur	Sulphur
Tebuconazol	Tebuconazol	—
Triadimenol	Triadimenol	—
Vinclozolin	—	—
<u>Insecticides / Miticides</u>		
<i>Bacillus thuringiensis</i>	<i>Bacillus thuringiensis</i>	<i>Bacillus thuringiensis</i>
Clofentezin	—	—
Deltamethrin	—	—
Fenbutatinoxid	—	—
Hexythiazox	—	—
Insegar	—	—
Methidathion	—	—
Oxydemeton-methyl	—	—
Paraffin oil	Paraffin oil	Paraffin oil
Parathion-methyl	—	—
Pheromone	Pheromone	Pheromone
Rape-seed oil	Rape seed oil	Rape-seed oil

acceptance of these wines with a name unknown to the customer is not very popular.

In the past years, another problem was discussed by many wine makers and grape growers who cultivate the vineyards under total green cover. It seems that the wines grown under such conditions have an inferior quality. At present, many studies are undertaken to investigate this effect and the exact interdependencies.

We assume that a considerable increase of organic viticulture is not to be expected in the future. Instead, integrated viticulture is increasing because it is easier to realize and because of the minor risk of a quantitative and qualitative yield reduction by critical attack of pests and diseases or by other factors. With regard to the environment, integrated viticulture is progressing by avoiding synthetic insecticides and herbicides without any risk (Table 6).

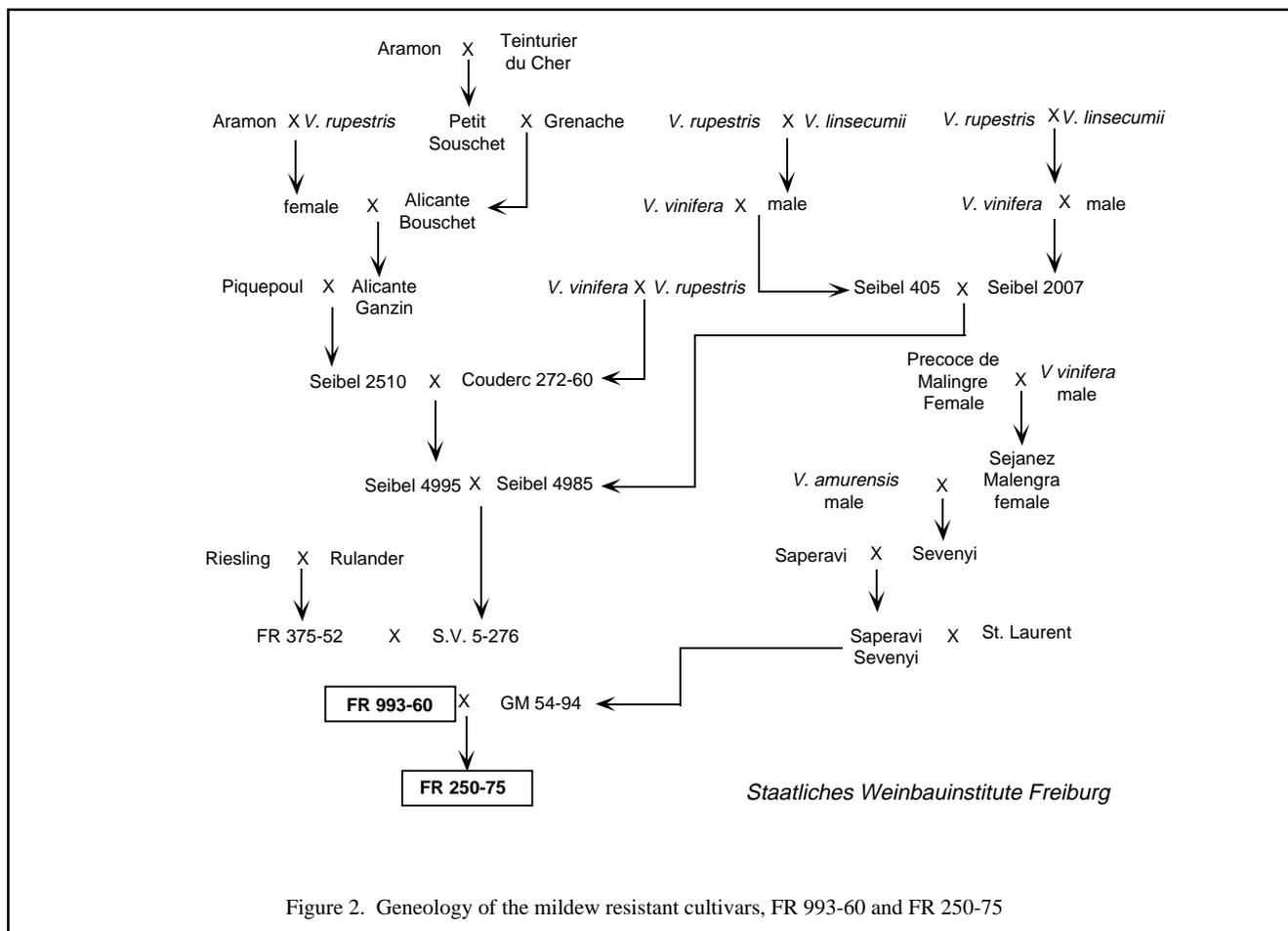


Figure 2. Geneology of the mildew resistant cultivars, FR 993-60 and FR 250-75

Organic viticulture requires a holistic philosophy, which will be limited to a select number of persons. The clientele for wines from organic production is limited, too. Most of the people don't accept an ideology, nor do they want to pay more for a wine produced for a healthy environment.