
ECOLOGICAL OLIVE PRODUCTION IN PORTUGAL – TECHNIQUES, VARIETIES AND OLIVE OILJorge Ferreira ¹

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PRODUCTION: TECHNIQUES AND HANDLING OF CROPS, AND PREPARATION**Summary**

In Portugal, ecological olive growing is the second crop in organic farming, with 21912 ha, 31,4% of all land certified area (69788 ha), according last available data from February 2002. It represents about 6,5% of all olive area in Portugal.

In order to describe main techniques followed by farmers in the Mediterranean Region, an international research network with MAICH co-ordination was done in several countries, including Portugal. In this country 12 questionnaires were made on farm, concerning ecological olive production. Main conclusions were the following ones:

- most of ecological olive area are at the east regions of Portugal (99,8%), because there are less pests and diseases, witch allow a good olive oil production without spraying;
- most of olive growers don't control any pest or disease;
- quality and quantity of organic olive oil is varying with pest and disease pressure, witch depends on climate conditions and different regional varieties;
- most of olive growers don't apply any organic fertiliser from outside of the farm;
- some of the growers make cover crops, but not all of them;
- soil erosion is a problem in some of the cases because of excessive tillage in the weed control;

Key-words: organic olive growing / Portugal organic olive oil

1.Introduction

In Portugal, organic farming is a production system in a moderate growth. Total certified area is about 69.788 ha (February 2002), while olive grove represents 31,4% of that area. Organic olive grove has 21.912 ha, the second crop after pastures. Organic olive grove is about 6,5% of all portuguese olive grove (335029 ha).

Almost all organic olive grove is on the eastern region of Portugal, near Spain. Eastern regions are the poorest of the country. There, organic products are very important to increase agriculture production income. Organic olive oil and organic table olives are good examples.

In other regions, as “Ribatejo e Oeste” , in the middle west of Portugal, near the “Tejo” river, there is also a big number of olive groves but not organic. Mean reason is a plant protection problem, difficult to control in organic farming – olive fruit fly (*Bactrocera oleae*). This pest is very harmful in the western regions of Portugal, where winter temperature is higher and summer temperature is lower than in another regions.

Normally between September and November, olive fly increases an olive fungal disease - *Colletotrichum gloeosporioides* – even more harmful for olive oil quality. This disease is very common in Portugal, especially in “Galega” variety. *B. oleae* and *C. gloeosporioides* are seriously damaging olives and olive oil production. The majority of organic farmers don’t make any plant protection practice. Therefore, quality of organic oil depends of pests and diseases problems. This attacks depends on the climate conditions, witch are different in different years and different regions. Northeast of Portugal (Trás-os-Montes) is the best region concerning plant protection problems. Normally there is no problem with olive fly and *C. gloeosporioides*. Thus, it’s easier to produce an high quality organic olive oil. In other regions its necessary to improve plant protection practices according with organic standards.

2.Fertilisation and plant protection practices

A recent network was done, with MAICH (Greece) co-ordination, concerning organic farming practices in the Mediterranean countries. In Portugal 12 questionnaires were answered by organic olive growers. Concerning fertilisation, cultivation and plant protection practices, results are as follows (table 1).

Table 1 – Fertilisation and plant protection practices in organic olive groves

Soil conservation and fertilisation		Plant protection	
Practice	Execution rate (%)	Practice	Execution rate (%)
Green manure	50	Protection of nuttutal enemies	100
Animal manure	33	Mass trapping / olive fly <i>Bactrocera oleae</i>	0
Compost	33	Biological control / olive moth <i>Prays oleae</i>	0
Other fertilisers	58	Copper / fungal diseases	62
Soil tillage	100	Other treatments	42

2.1.Soil fertilisation and cultivation

50% of farmers are doing green manure, 33% are applying animal manure or organic compost, and 58% said to use other fertilisers such as natural phosphates.

All farmers inquired are making soil tillage, at least once a year, usually twice or even more times a year. This work is made also in the rain season (since October, until April), intensifying soil erosion. This problem is the biggest in order to maintain a sustainable organic olive grove.

Soil cultivation practices with a few tillage and/or no tillage, need to be improved to get a good yield with a minimum of soil erosion (Ferreira *et al* 2000).

2.2.Plant protection practices

According with the same questionnaire, 83% of farmers said to apply at least one measure to improve beneficial insects but no one apply any control measure against

two main pests – olive fly and olive moth. 67% of farmers apply copper salts against fungal diseases (*Colletotrichum gloeosporioides* and *Spilocaea oleagina*) and bacterial diseases (*Pseudomonas savastanoi*). 42% apply other plant protection products, such as mineral oils against olive scale *Saissetia oleae*.

This situation needs to be improved. Soil conservation and plant protection practices are necessary. If not, organic olive and olive oil production will not increase on quantity and quality.

3. Research and extension projects

Until now, there was only one research project about organic olive growing in Portugal. That project was done in the Northeast region during 3 years (1998-2000), and main conclusion were:

- natural enemies are present with high populations and bio-diversity in the olive grove of “Trás-os-Montes” (table 2);
- beneficial insects have an important role in the control of olive black scale *Saissetia oleae* and *Prays oleae*, but less important concerning olive fly control;
- traditional biological control (release of beneficial insects) against olive pests, is to expensive to be applied;
- biological control with *Bacillus thuringiensis* (Bt) against *P. oleae* is efficient and has medium costs;
- mass trapping with “Eco-trap” against *B. oleae* was efficient until September but not enough in the following season (Bento *et al*, 1999);
- economic threshold to apply Bt against *P. oleae* was fixed for the region (table 3) (Bento, 2000).

Table 2 – Beneficial insects in the olive groves of “Trás-os-Montes” – family, species and olive pest concerned (Torres *et al*, 2000)

Natural enemies		Pests
Family	Species or genus	
<i>Anthocoridae</i>	<i>Anthocoris nemoralis</i>	<i>Prays oleae</i> , <i>Euphyllura olivina</i> , <i>Liothrips oleae</i>
<i>Miridae</i>	<i>Deraeocoris sp.</i>	<i>Prays oleae</i> , <i>Euphyllura olivina</i> , <i>Saissetia oleae</i>
<i>Chrysopidae</i>	<i>Chrysoperla carnea</i>	<i>Prays oleae</i>
<i>Coccinellidae</i>	<i>Chilocorus bipustulatus</i> , <i>Exochomus Quadripustulatus</i>	<i>Saissetia oleae</i>
<i>Pteromalidae</i>	<i>Scutellista cyanea</i> , <i>S. obscura</i> , <i>Moranila californica</i>	<i>Saissetia oleae</i>
<i>Encyrtidae</i>	1) <i>Ageniaspis fuscicollis</i> var. <i>praysincola</i> Silv., 2) <i>Metaphycus lounsburyi</i> , <i>M. flavus</i> , <i>M. helvolus</i>	1) <i>Prays oleae</i> 2) <i>Saissetia oleae</i>
<i>Aphelinidae</i>	<i>Coccophagus lycimnia</i> , <i>C. semicircularis</i>	<i>Saissetia oleae</i>
<i>Trichogrammatidae</i>	<i>Trichogramma cacoeciae</i> , <i>T. embriophagum</i>	<i>Prays oleae</i>
<i>Braconidae</i>	1) <i>Chelonus eleaphilus</i> , <i>Apanteles xanthostigmus</i> 2) <i>Opius concolor</i>	1) <i>Prays oleae</i> 2) <i>Bactrocera oleae</i>

Table 3 – Economic threshold for treatment of *Prays oleae* (second generation), in Northeast Portugal (Bento, 2000)

Sampling method	Economic threshold
Visual observation of 100 inflorescence (2 x 50 olives)	4-6% : medium to high yield 8-11% : low yield
Pheromone trap: - fields < 1 ha: 1 trap - fields 1-6 ha: 2 traps - fields > 6 ha: 1 trap / 3 ha	500 moths/trap (cumulative value): medium to high yield 900 moths/trap (cumulative value): low yield

Other research works are needed to improve pest and diseases control and soil conservation and fertilisation. Some extension work is being done. The most important for the moment is the use of olive residues to produce an organic fertiliser by composting those residues.

4.Olive varieties and olive oil

Portugal has different olive growing regions with different regional varieties of olives. There are 5 denominations of olive oils protected origin (DOP) (table 4).

Table 4 – Olive oils in Portugal – Denomination of protected origin (DOP) and regional varieties

DOP	DOP and geographic location	Olive regional varieties
Azeite de Moura	Olive oil from Moura / Southeast	Galega-grada-de-Serpa, Cordovil-de-Serpa, Verdeal-de-Serpa
Azeite de Trás-os-Montes	Olive oil from Trás-os-Montes / Northeast	Verdeal-de-Trás-os-Montes, Cobrançosa, Madural, Negrinha, Santulhana
Azeite da Beira Interior	Olive oil from Beira Interior / Middle east	Bical, Cordovil-de-Castelo-Branco, Galega
Azeite do Norte Alentejano	Olive oil from north Alentejo / Middle and Southeast	Galega, Redondil, Conserva-de-Elvas
Azeite do Ribatejo	Olive oil from Ribatejo / Middle West	Galega, Cobrançosa

In these regions organic olive oil can be labelled as organic and also as DOP. There are other olive regional varieties but these are the most important. Each variety gives a specific oil, as we can taste for the following two important varieties:

- Galega (the most spread variety in Portugal), high fruit flavour, low piquant, and almost no bitter;
- Cobrançosa, medium fruit flavour, high piquant and bitter.

At northeast region of Portugal (Trás-os-Montes), it's easier to produce high quality organic olive oil. Main reason is lower incidence of pests and diseases related to climate

conditions and ecological balance. This quality had already been proved at international events as PremioBiol (Andria / Italy).

5. Conclusions

Organic olive production in Portugal needs know-how to improve quantity and quality. Soil conservation and fertilisation practices as well as plant protection measures are not enough to produce enough organic olive oil of high quality. With actual conditions and practices, it's not easy to produce good olive oil, except in specific regions with the better natural conditions and less pests and diseases problems. Northeast region of Trás-os-Montes has those conditions and is already producing high quality organic olive oils. Other regions could produce also good oils with their specific regional olive varieties, but that's not easy with the actual practices on olive groves.

Olive fruit fly and the fungal disease *Colletotrichum gloeosporioides* are the two main plant protection problems, concerning oil quality.

Natural enemies are present in the olive groves, they are very important in the natural control of some olive pests, but not enough to control olive fly *Bactrocera oleae*. Mass trapping should be the best method of control but needs to be improved.

Other important olive pest, olive moth *Prays oleae*, is easier to control. Economic threshold was established and control spray with *Bacillus thuringiensis* was efficient against first and second generation.

Fungal diseases are being treated with copper salts, an efficient and important treatment in the organic olive grove.

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