

Tobacco alternatives in Greece. A preliminary evaluation and classification

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1. Introduction

In 2003-2004, the European Union (EU) introduced direct payments to EU farmers solely based on historical payments. The direct payments, to be implemented between 2005 and 2007 at the discretion of the member states, greatly enhance ongoing reforms of the EU's Common Agricultural Policy (CAP). Such payments, by being up to 100 percent decoupled from current production, allow farmers to make production decisions based more on market signals than policy interventions.

Following the decoupling of the subsidies of this reform, the producer receives a part of the subsidies (e.g. 60%) obtained during the reference period as a fixed payment and the rest (e.g. 40%) as area payment. The concept of decoupling has become one of the key issues in agricultural policy design. Several definitions have been put forward, all of them to the extent of the production effects of farm support. In particular, a policy scheme is defined as fully decoupled if it does not influence production decisions of farmers receiving payments and that it permits free market determination of prices. Finally, a policy scheme is defined as partial decoupling if it results in production that exceeds the level that would exist without it but does not exceed the level that would exist if the scheme was fully coupled to

Abstract

The CAP reform for the tobacco sector has the aim to phase out the subsidy payment for tobacco cultivation. From 2006 to 2009, a decoupled payment is provided in the framework of the Single Farm Payment Scheme. This will have great impacts on the tobacco farmers in terms of income and employment.

This study is aimed at identifying tobacco alternatives in Greece, which can provide tobacco farmers with employment and income. Such alternatives have been evaluated and classified according to different criteria and this led to the drafting of a list of alternative crops being the most suitable for every region concerns.

To this end, we studied two tobacco regions in Greece, the region of the Tobacco Cooperative of Ellassona, in Larissa, Thessaly, and the region of Tobacco Cooperative of Toumpa, in Kilkis, Central Macedonia.

The study was elaborated in the context of the research project entitled DIVTOB (Manos *et al.*), which is a European FP6 funded project under Priority 8 - Policy related research - Tools and assessment methods for sustainable agriculture and forestry management.

Résumé

*La réforme de la PAC pour le secteur du tabac a le but ultime de supprimer progressivement le paiement de subventions à la production de tabac. Entre l'an 2006 et l'an 2009, le découplage des paiements sera introduit dans le cadre du Paiement Unique par Exploitation. Ce nouveau régime de paiement aura un impact significatif sur les revenus et l'emploi des producteurs de tabac. Cette étude vise à identifier les alternatives à la culture du tabac en Grèce qui pourraient devenir une nouvelle source d'emploi et de revenus pour les producteurs de tabac. Ces alternatives ont été évaluées et classées sur la base de différents critères et ceci nous a permis de rédiger une liste des meilleures cultures alternatives pour satisfaire les besoins de chaque région. C'est donc dans ce but ultime que nous avons étudié deux régions grecques de production de tabac: Ellassona, à Larissa, Thessalie, et Toumpa, à Kilkis, Macédoine centrale. Cette étude a été menée dans le cadre du projet de recherche DIVTOB (Manos *et al.*), concernant la 8^{ème} priorité thématique du 6^{ème} Programme-cadre – recherche appliquée à la politique – Instruments et méthodes d'évaluation pour l'agriculture durable et la gestion des forêts.*

production (Cahill, 1997; Semos, 2004). In order to receive this area payment, the producer does not need to harvest; the only requirement is to reach the open capsule stage. This requirement would make more profitable for most producers to almost abandon their tobacco production, which would involve a drastic reduction in input usage (fertilizers, pesticides and irrigation water) and no harvest (Arriaza, 2006).

This can have a great impact on the tobacco growers in terms of income and employment. To avoid the negative impacts, we should identify a set of tobacco alternatives that could provide tobacco farmers with employment and income and then we should evaluate and classify them according to different simple criteria alternatives.

Our study identified different tobacco alternatives that resulted from field research in two areas in Greece: Ellassona, in Larisa prefecture, Thessaly, where the Agricultural Cooperative of Cigars is located, and Toumpa, in Kilkis prefecture, Central Macedonia, where the Tobacco Cooperative is located. We collected necessary data from these two cooperatives using a questionnaire. Extra data were taken from publications of the Ministry of Agriculture and the Department of Agricultural Economics of the Aristotle University of Thessaloniki. The concentrated data were used to estimate the technical and economic coefficients of the tobacco alternatives in the two study regions.

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On the basis of these coefficients, we also did a preliminary evaluation and classification of the tobacco alternatives using different simple criteria, namely income (gross return), gross margin, variable costs and labour requirements in 2005 - 2006. Even though more complete and effective criteria, such as profit and total costs, are not taken into account, the results of this evaluation and classification show which are the best alternatives to advise farmers as substitutes of tobacco and/or other existing crops.

2. Tobacco alternatives in Ellassona

Tobacco alternatives in Ellassona can be subdivided into three different categories:

- 1) Aromatic and medical crops (oregano, mountain tea, basil, non irrigated mint, irrigated mint);
- 2) Energy crops (sunflower, sugar beet, oilseed rape, anise);
- 3) Organic crops (wheat, durum wheat, barley, maize, alfalfa, and vetch).

Furthermore, another alternative to tobacco in Ellassona is a new crop, called stevia. This crop is at experimental phase in Greece and so prices reported in this document report are only indicative.

The technical and economic coefficients of tobacco and alternative crops are shown in Table 1. Their classification is presented in Table 2.

As far as aromatic and medical crops are concerned, we estimate that mountain tea has the highest income, followed by basil, oregano, irrigated mint and non irrigated mint. Also, mountain tea has the highest gross margin, followed by oregano, irrigated mint, non irrigated mint and basil.

Differences in these two cases are explained by their variable, which are low for non irrigated mint and high for basil. So, even if some crops give a high income, they may have high variable costs, that is why their gross margin becomes low. Furthermore, non irrigated mint has the lowest labour requirements, followed by irrigated mint, oregano, mountain tea and basil, requiring a lot of work. Also, the income average for these crops is 8,740 euros/ha, mountain tea's income is 5,060 euros/ha higher than the average, and

non irrigated mints' income is 3,800 euros/ha lower than the average.

Comparing tobacco's technical and economic coefficients (Table 1) with these crops, it is obvious that mountain tea and oregano are much more profitable than tobacco (oregano's gross margin is 4,507 euros/ha higher than tobacco's and mountain tea's gross margin is 6,517 euros/ha higher than tobacco's), followed by irrigated mint and non irrigated mint. Even though results show that aromatic and medical crops precede, these crops can not be cultivated in big areas as it is by contrast the case of tobacco.

As far as energy crops are concerned, we estimate that sugar beet presents the highest income, followed by anise, sunflower and oilseed rape. On the basis of their gross margin, it is obvious that anise presents its highest value, followed by sugar beet, oilseed rape and sunflower.

Sugar beet and anise have higher variable costs than oilseed rape and sunflower, but all these crops have lower variable costs than tobacco. More analytically, variable costs of sugar beet, the highest of this category, are equal to 1,779 euros/ha and tobacco's variable costs are 7,232 euros/ha. This means that variable costs of sugar beet are only 24.6% of tobacco's variable costs.

Moreover, oilseed rape has the lowest labour requirements for this category, followed by sunflower, sugar beet and anise which require the same work. Also, the income average for these crops is 1,560.8 euros/ha, sugar beet's income is 839.2 euros/ha higher than the average and oilseed rape's income is 795.8 euros/ha lower than the average.

Comparing tobacco's technical and economic coefficients (Table 1) with these crops, we can estimate that tobacco is more profitable than these alternatives. Furthermore, energy crops need proportional infrastructure, which are not still enough in Greece.

As mentioned before, organic crops are the third category of tobacco alternatives in Ellassona. On the basis of their income, we can estimate that alfalfa has the highest income, followed by maize, vetch, barley, wheat and finally durum wheat. As for their gross margin, maize has the highest gross margin, followed by alfalfa, vetch, barley, wheat and durum wheat.

Table 1 – Technical and economic coefficients of tobacco and tobacco alternatives in Ellassona (2005 - 2006).

Tobacco	Aromatic and Medical crops					Energy crops				Organic crops						Stevia (2006)
	Oregano	Mountain tea	Basil	Non irrigated mint	Irrigated mint	Sunflower	Sugar beet	Oilseed rape	Anise	Wheat	Durum wheat	Barley	Maize	Alfalfa	Vetch	
Prices perceived by farmers (Euro/kg)																
1.3	5	6	3	0.26	0.26	0.18	0.04	0.24	2.27	0.21	0.24	0.18	0.22	0.03	0.24	3.00
Yield (kg/ha)																
2,500	1,800	2,300	4,370	11,000	19,000	3,000	60,000	3,000	1,000	1,659	1,260	2,100	7,700	70,000	4,620	4,000
Subsidies (euros/ha)																
2.4	0	0	0	0	0	268.1	0	45	0	335	335	335	600	600	335	0
Income (euros/ha)																
9,250	9,000	13,800	13,110	2,860	4,940	808.1	2,400	765	2,270	683.39	634.88	717.2	2324.8	2560	1434.56	12,000
Variable costs (euros/ha)																
7,232	2,475.00	5,265.00	11,895.70	641.6	1,106.40	650.8	1,779.00	351	1,499.70	166	166	158	1,015.20	1,263.50	353.1	7,210
Current gross margin (euros/ha)																
2,018	6,525	8,535	1,215	2,218	3,834	157.3	621	414	770	517	469	559	1,310	1,297	1,081	4,790
Labour (hours/ha)																
2,150	320	1,425	2,380	120	300	200	330	65	330	35	35	35	240	250	73	1,074

As it is obvious maize and alfalfa are the organic crops with the highest income and gross margin. On the contrary, their variable costs are high and they have more labour requirements than the other alternatives of this category. More analytically, barley, wheat and durum wheat have the lowest variable costs, followed by vetch, alfalfa and maize. Barley, wheat and durum wheat have the fewest labour requirements, followed by vetch, maize and alfalfa.

The gross margin average for these crops is 872.2 euros/ha, maize's gross margin is 437.8 euros/ha higher than the average and durum wheat's gross margin is 403.2 euros/ha lower than the average.

Comparing tobacco's technical and economic coefficients (Table 1) with these crops, we can estimate that tobacco is more profitable than these alternatives.

Finally, the last alternative for tobacco in Ellassona is represented by stevia. In 2006, stevia's income was 12,000 euros/ha and gross margin was 4,790 euros/ha. It is obvious

a classification (Table 2) of all tobacco alternatives in Ellassona together, which is very useful for farmers.

Farmers in Ellassona can substitute the existing crops with some of these alternatives, depending on their needs. They have already cultivated some energy crops, but they are in an experimental stage. They have also been cultivating oilseed rape for three years. Moreover, they cultivate sunflower, anise, oregano and stevia with the help and consultation of the University of Thessaly and of the University of Hohenheim. As far as organic crops are concerned, efforts are being made.

In any case, as already shown, the most profitable alternatives for Ellassona, even more profitable than tobacco, are mountain tea, oregano, irrigated mint, stevia and non irrigated mint. Also, all alternatives, with the exception of basil, have lower variable costs and fewer labour requirements than tobacco. However, this report does not take into account more sufficient and effective criteria, such profit and total cost.

Finally, attention must be paid to the fact that aromatic and medical crops cannot be cultivated in big areas and that energy crops need proportional infrastructure, which is not still adequate to cover the possible great increase of the cultivated areas.

3. Tobacco Alternatives in Toumpa

Tobacco alternatives in Toumpa are separated in four categories:

- 1) Aromatic and medical crops (non irrigated oregano, irrigated oregano, non irrigated mountain tea, irrigated mountain tea, basil, non irrigated thyme, irrigated thyme, mint, lavender, camomile);
- 2) Energy crops (sunflower, sugar beet, oilseed rape, anise);
- 3) Organic crops (wheat, durum wheat, barley, maize, alfalfa, vetch);
- 4) Fruit trees (cherries, plums, pears, pomegranates).

Furthermore, another alternative crop for tobacco in Toumpa is the already mentioned stevia. We underline once more that this crop is at experimental stage in Greece and therefore its prices in this report are only an indication.

The technical and economic coefficients of tobacco and alternative crops in Toumpa are shown in Table 3. Their classification is presented in Table 4.

Table 2 – Classification of all tobacco alternatives in Ellassona according to different criteria.

Tobacco alternatives in Ellassona region			
Income	Gross Margin	Variable costs	Labour requirements
Mountainous tea	Mountainous tea	Barley	Wheat, durum wheat and barley
Basil	Oregano	Wheat and durum wheat	
Stevia	Stevia	Oilseed rape	Oilseed rape
Oregano	Irrigated mint	Vetch	Vetch
Irrigated mint	Non irrigated mint	Non irrigated mint	Non irrigated mint
Non irrigated mint	Maize	Sunflower	Sunflower
Alfalfa	Alfalfa	Maize	Maize
Sugar beet	Basil	Irrigated mint	Alfalfa
Maize	Vetch	Alfalfa	Irrigated mint
Anise	Anise	Anise	Oregano
Vetch	Sugar beet	Sugar beet	Sugar beet and anise
Sunflower	Barley	Oregano	
Oilseed rape	Wheat	Mountain tea	Stevia
Barley	Durum wheat	Stevia	Mountain tea
Wheat	Oilseed rape	Basil	Basil
Durum wheat	Sunflower		

Ranking: Income and Gross Margin: high to low, Variable costs and Labour requirements: low to high

that this crop is more profitable than tobacco and also stevia's labour requirements are almost 42 % of tobacco's requirements.

So far, this was an evaluation and a classification of each category of tobacco alternatives separately. Below, there is

Table 3 – Technical and economic coefficients of tobacco and tobacco alternatives in Toumpa (2005 - 2006).

Tobacco	Aromatic and medical crops										Energy crops			Organic crops					Fruit trees				Stevia (2006)		
	Non irrigated oregano	Irrigated oregano	Non irrigated mountain tea	Irrigated Mountain tea	Basil	Non irrigated thyme	Irrigated thyme	Mint	Lavender	Camomile	Sunflower	Sugar beets	Oilseed rape	Anise	Wheat	Durum Wheat	Barley	Maize	Alfalfa	Vetch	Cherries	Plums		Pears	Pomegranates
Prices perceived by farmers (euros/kg)																									
0.99	2.3	1	0	0	0	1.70	1.30	0.5	4	0	0.15	0.04	0.27	1.5	0.21	0.21	0.21	0.21	0.09	0.34	1.8	0.5	0.82	1.2	3.00
Yield (kg/ha)																									
2,150	3,200	2,500	1,000	1,500	11,000	1,400	1,920	4,600	2,180	6,000	2,200	60,000	2,300	1,000	2,700	2,325	3,225	8,050	87,200	6,600	10,000	21,000	30,000	25,000	4,000
Subsidies (euros/ha)																									
3.92	0	0	0	0	0	0	0	0	0	0	135.0	0	45	0	315	315	315	600	600	315	0	0	0	0	0
Income (euros/ha)																									
10,471	3,000	2,500	6,000	9,000	33,000	2,464	3,379	20,980	8,720	18,000	485	2,400	606	1,500	899	818	1,905	2,270	3,216	1,985	20,880	10,950	22,520	30,000	12,000
Variable costs (euros/ha)																									
8,313	3,365	1,463	4,481	5,003	7,428	1,053	1,363	10,380	4,320	1,375	263	1,668	151	1,220	241	241	219	1,240	962	303	6,242	4,560	6,093	12,000	7,210
Current gross margin (euros/ha)																									
2,158	6,635	1,037	1,519	3,997	25,572	1,411	2,016	10,600	4,400	16,625	222	732	313	280	658	577	786	1,036	2,276	3,513	14,638	6,390	16,427	18,000	4,790
Labour (hours/ha)																									
2,350	279	313	1,308	1,928	2,198	213	309	3,130	1,184	379	63	330	69	330	24	24	24	213	234	84	1,000	1,120	1,390	1,120	1,074

As far as aromatic and medical crops are concerned, we can estimate that basil has the highest income followed by mint, camomile, irrigated mountain tea, lavender, non irrigated mountain tea, irrigated thyme, non irrigated oregano, irrigated oregano and non irrigated thyme. By using as criterion their gross margin, it is obvious that basil has the highest gross margin, followed by mint, camomile, lavender, irrigated mountain tea, irrigated thyme, non irrigated oregano, non irrigated mountain tea, non irrigated thyme and irrigated oregano.

Non irrigated thyme has the lowest variable costs of this category, followed by non irrigated oregano, irrigated thyme, camomile, irrigated oregano, lavender, non irrigated mountain tea, irrigated mountain tea, basil and mint, which has very high variable costs. Moreover, all these crops, with the exception of mint, have lower variable costs than tobacco.

Moreover, non irrigated thyme has the lowest labour requirements, followed by non irrigated oregano, irrigated thyme, irrigated oregano, camomile, lavender, non irrigated mountain tea, irrigated mountain tea, basil and mint, which requires a lot of work. Also, the income average for these crops is 11,596.32 euros/ha, basil's income is 21,403.68 euros/ha higher than the average and non irrigated thyme's income is 9,132.32 euros/ha lower than the average.

Comparing tobacco's technical and economic coefficients (Table 3) with these crops, it is obvious that basil, mint and camomile are much more profitable than tobacco (basil's gross margin is 23,417 euros/ha higher than tobacco's, mint's gross margin is 17,445 euros/ha higher than tobacco's, camomile's gross margin is 14,449 euros/ha higher than tobacco's), followed by lavender and irrigated mountain tea. Though results show that aromatic and medical crops precede the others, these crops can not be cultivated in big areas like tobacco.

As far as energy crops are concerned, we can estimate that sugar beet has the highest income of this category, followed by anise, oilseed rape and sunflower. Using as criterion their gross margin, it is obvious that sugar beet has the highest gross margin, followed by oilseed rape, anise and sunflower.

Sunflower has the lowest variable costs of this category followed by oilseed rape, anise and sugar beet. Furthermore, sunflower and oilseed rape have the same labour requirements, as it is the case of sugar beet and anise.

Comparing tobacco's technical and economic coefficients (Table 3) with these crops, it is obvious that tobacco is more profitable but all of them have lower variable costs and also fewer labour requirements than tobacco. However, energy crops need proportional infrastructure, which is not still enough in Greece.

The third category of tobacco alternatives in Toumpa, as it was mentioned before, is represented by organic crops. Again, we can estimate that alfalfa has the highest income, followed by maize, vetch, barley, wheat and durum wheat.

Alfalfa has the highest gross margin, followed by vetch, maize, barley, wheat and durum wheat.

Although alfalfa has high variable costs and the highest work requirements, it is obvious that it has the best economic coefficients of this category. Variable costs are lower for barley, a little higher for wheat and durum wheat, followed by vetch, alfalfa and maize.

Wheat, durum wheat and barley require the same work, vetch requires only a few working hours more than them, and there are maize and alfalfa.

Gross margin's average for these crops is 1,134.8 euros/ha, alfalfa's gross margin is 1,117.2 euros/ha higher than the average and durum wheat's gross margin is 557.8 euros/ha lower than the average.

Comparing tobacco's technical and economic coefficients (Table 3) with these crops, we can estimate that only alfalfa is more profitable than tobacco, but all these alternatives have lower variable costs and also fewer labour requirements than tobacco.

The fourth category of the tobacco alternatives in Toumpa is represented by fruit trees. It is obvious that pomegranates have the highest income, followed by pears, cherries and plums. As for the gross margin, the classification is the same.

It is obvious that all these trees are very profitable and specifically much more profitable than tobacco. Tobacco's gross margin is only 12 % of pomegranates' gross margin, 13 % of pears' gross margin, 15 % of cherries' gross margin and 39 % of plums' gross margin. Only pomegranates have higher variable costs than tobacco, but all have fewer labour requirements. More analytically, pomegranates have the highest variable costs, followed by cherries, pears and finally plums. As far as labour is concerned, plums and pomegranates have the lowest labour requirements, followed by pears and cherries.

Finally, the last alternative for tobacco in Toumpa is stevia. In 2006, stevia's income was 12,000 euros/ha and its gross margin 4,790 euros/ha. Again, it is obvious that stevia is a more profitable crop than tobacco. Also, stevia's labour requirements are almost 42 % of tobacco's requirements.

So far, this was an evaluation and classification of each category of the tobacco alternatives. Below there is a classification (Table 4) of all tobacco alternatives in Toumpa together, which is very useful for the farmers under the present conditions.

As previously shown, the most profitable alternatives for the farmers in Toumpa region, being also more profitable than tobacco, are basil, mint, pomegranates, camomile, pears, cherries, plums, lavender, irrigated mountain tea, stevia and alfalfa. All the alternatives, except from mint and pomegranates, have lower variable costs than tobacco and also all the alternatives, except from mint, have fewer labour requirements than tobacco. However, as we mentioned this report does not include more sufficient and effective criteria, like profit and total cost. In any case, Toumpa's climate encourages fruit trees.

Finally, attention must be paid to the fact that aromatic and medical crops can not be cultivated in great areas and that energy crops need proportional infrastructure, which are not still adequate to cover a possible great increase to cultivated area.

Table 4 – Classification of all tobacco alternatives in Toumpa according to different criteria.

Tobacco alternatives in Toumpa			
Income	Gross margin	Variable costs	Labour requirements
Basil	Basil	Barley	Wheat, durum wheat and barley
Pomegranates	Mint	Wheat and durum wheat	
Mint	Pomegranates	Sunflower	Oilseed rape and sunflower
Pears	Camomile	Oilseed rape	
Cherries	Pears	Vetch	Non irrigated thyme
Camomile	Cherries	Alfalfa	Maize
Stevia	Plums	Non irrigated thyme	Alfalfa
Plums	Stevia	Anise	Non irrigated oregano
Irrigated mountain tea	Lavender	Maize	Irrigated thyme
Lavender	Irrigated mountain tea	Non irrigated oregano	Irrigated oregano
Irrigated mountain tea	Alfalfa	Irrigated thyme	Sugar beet and Anise
Irrigated thyme	Irrigated thyme	Camomile	
Alfalfa	Non irrigated oregano	Irrigated oregano	
Non irrigated oregano	Mountainous tea not irrigated	Sugar beet	Camomile
Irrigated oregano	Vetch	Lavender	Stevia
Non irrigated thyme	Non irrigated thyme	Non irrigated mountain tea	Plums and pomegranates
Sugar beet	Irrigated oregano	Plums	Lavender
Maize	Maize	Irrigated mountain tea	Non irrigated mountain tea
Vetch	Barley	Pears	Pears
Anise	Sugar beet	Cherries	Irrigated mountain tea
Barley	Wheat	Stevia	Cherries
Wheat	Durum wheat	Basil	Basil
Durum wheat	Oilseed rape	Mint	Mint
Oilseed rape	Anise	Pomegranates	
Sunflower	Sunflower		

Ranking: Income and Gross margin: high to low. Variable costs and Labour requirements: low to high

4. Conclusions

This study aimed at identifying tobacco alternatives in Greece, which would provide tobacco farmers with employment and income. These alternatives were evaluated and classified according to different simple criteria in order

to eventually draft a list of alternative crops, which are most suitable for every region concerns.

Research focused on two tobacco-growing areas in Greece: Ellassona, in Thessaly, central Greece, where the Agricultural Cooperative of Cigars is located, and Toumpa, in Macedonia, northern Greece, where the Tobacco Cooperative is located. We identified 25 tobacco alternatives in these regions which can be subdivided into four categories: 1) aromatic and medical crops, 2) energy crops, 3) organic crops, and 4) fruit trees. Also, another alternative for tobacco is a new crop, called stevia, which is still at an experimental stage.

We concluded that the most profitable alternatives in Ellassona are the aromatic and medical crops and stevia. However, attention must be paid to the fact that aromatic and medical crops cannot be cultivated in big areas because of the marketing channels deficiency and that stevia is still at an experimental stage. As far as Toumpa is concerned, the most profitable alternatives for farmers seem to be represented by fruit trees and aromatic plants that are particularly favoured by Toumpa's climate.

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