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Assessment of Olive-Growing Sector Within Proximity Project for Integrated Rural Development (PPDRI). Case of the Wilaya of Guelma (Eastern Algeria)

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Abstract—The study aims to evaluate the olive-growing sector created as part of a rural development policy launched in Algeria in 2006.The study was carried out in June 2022 in the rural areas of the Guelma wilaya in north-eastern Algeria. An analysis of the evolution of production, surface area and yields in the wilaya was carried out, followed by a survey of 59 households benefiting from olive tree planting under the PPDRI (Integrated Rural Development Proximity Project) program. The results showed a decline in production and yields, despite the stability of the areas planted. At the same time, household surveys showed that the success rate was 52.50%. In addition, several factors are linked to the success of the project, notably improved living conditions, but most socio-economic criteria are not associated. In the light of this study, the causes of failure mentioned in the study need to be taken into consideration to develop both the sector and rural areas.

IndexTerms— Algeria, Guelma, Olive growing, PPDRI, rural development, PRR, Production.

1 INTRODUCTION

The olive tree is characteristic of the Mediterranean basin and Algeria. Its cultivation is considered one of the best adapted to the Mediterranean climate. [1], it adapts to hydric stress [2], traditionally cultivated in extensive dry cultivation, little mechanized [3]. In addition, olive trees are drought-resistant.[4].

Olive-growing contributes to the employment of the rural population [5], but low productivity and profitability mean that rural populations are abandoning their traditional, economically unviable crops, further marginalizing them. [6],[7]..This is particularly the case for small farms [8]., which are the majority of farmers in the PPDRI. On the other side, this crop has improved the quality of life of several rural families in the Algerian highlands [9]..

Algeria is one of the world's leading olive oil producers. It has considerable potential for development in olive

growing.[10]. Despite the autonomy achieved for this product, exports have remained modest or even absent according to ICO statistics in 2024[11]., characterized by fluctuating production from one year to the next over the last thirty years (Figure1).

In addition, the reasons may include low orchard yields ranging from 13.8 in 2009 to 20 kg/tree in 2019, with an average of 19 kg/tree according to ONS, 2022[12]. Lachibi in 2019[13], found that yield is linked to the variety and age of the plants. In parallel, a 127% increase in area was recorded between 2002 and 2017[14].

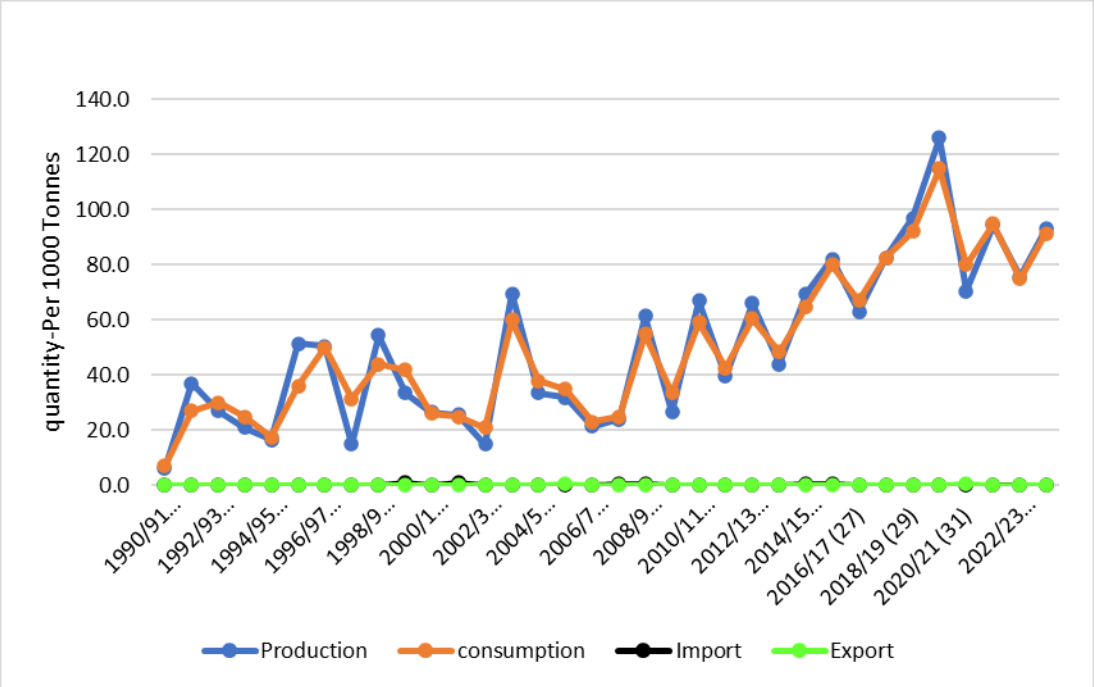

Fig 1: Trends in olive oil production, consumption, exports and imports in Algeria (Authors' calculations based on ICO data, 2024).

To increase olive production and orient itself towards the world market, Algeria has launched several policies to develop this sector, particularly in rural areas. The PRR (Politique de Renouveau Rural - Rural Renewal Policy) aims to increase and extend olive-growing by improving living conditions for local residents, creating jobs, improving incomes and ensuring a sustainable source of household income.

The Rural Renewal Policy, a bottum-up policy, was launched in 2006. Through its operational tool PPDRI, it aims to improve living conditions, revitalize rural areas and tackle the phenomenon of rural exodus. The olive tree plantation is part of PPDRI's 2nd federative theme, which is economic diversification.

The aim of this work is to evaluate the olive plantation as part of the PPDRI program. This study was carried out in rural areas of the Guelma wilaya in northeastern Algeria, with the aim of answering the following research questions:

What factors are linked to the success of olive plantation projects?

What results have been achieved? Are these projects viable and sustainable?

Have the projects succeeded in improving the income and living conditions of the beneficiaries?

2 MATERIAL AND METHOD

2.1 Study area

The wilaya of Guelma is located in northeastern Algeria. It covers an area of 3,686.84 km2 and had a population of 576,955 in 2022. Its bioclimatic range is sub-humid to the north and center, with rainfall of up to 1,000 mm/year, and semi-arid to the south, with rainfall of 400 to 500 mm.

The study area is characterized by extensive forest cover, representing 37.82% of its total surface area, and a

Useful Agricultural Area (UAA) of 48%. Olive-growing accounts for 72% of the area under arboriculture.

2.2 Method

For this study we used several sources of information: the database of Forest Conservatory and Department of Agriculture - Guelma. In addition, we conducted free, semi-structured interviews with administrative actors and household surveys with beneficiaries of olive plantation projects under PPDRI. The survey was carried out in June 2022.

The evaluation criteria are divided into household socio-economic criteria: age of head of household, gender, level of education, household size, place of residence and activity, source of income, monthly income, agricultural training, involvement of family members in working the land. At the same time, criteria related to orchard characteristics and project success: orchard area, olive yield in Kg per tree, crop density, tree losses, rain-fed or irrigated olive grove management, adapted variety, project success and other secondary parameters.

The information obtained was processed using SPSS V 20 software. We performed a bivariate analysis to determine the various correlations with project success.

2.3 Sampling

To determine the sample size, we used several levels of sampling. Firstly, we selected the communes with the highest number of PPDRI actions (all types of action combined) and identified 10 communes, i.e. around 25% of communes. Next, we carried out a sampling proportionate to the size of the beneficiaries (10%), and obtained 59 completed questionnaires. The interviewees were selected at random.

3 RESULTS AND DISCUSSION:

3.1 Development of the olive-growing sector in the wilaya:

According to 2011 statistics, the sown olive-growing area was 8,234 Hectares. But as of 2016, we have noticed a stability in olive acreage, which varies between 9443 and 9661.85 Hectares (Figure 2), with a slight increase of a few hundred hectares.

This stability can be explained by the completion of PPDRI planting programs without the launch of other planting actions.

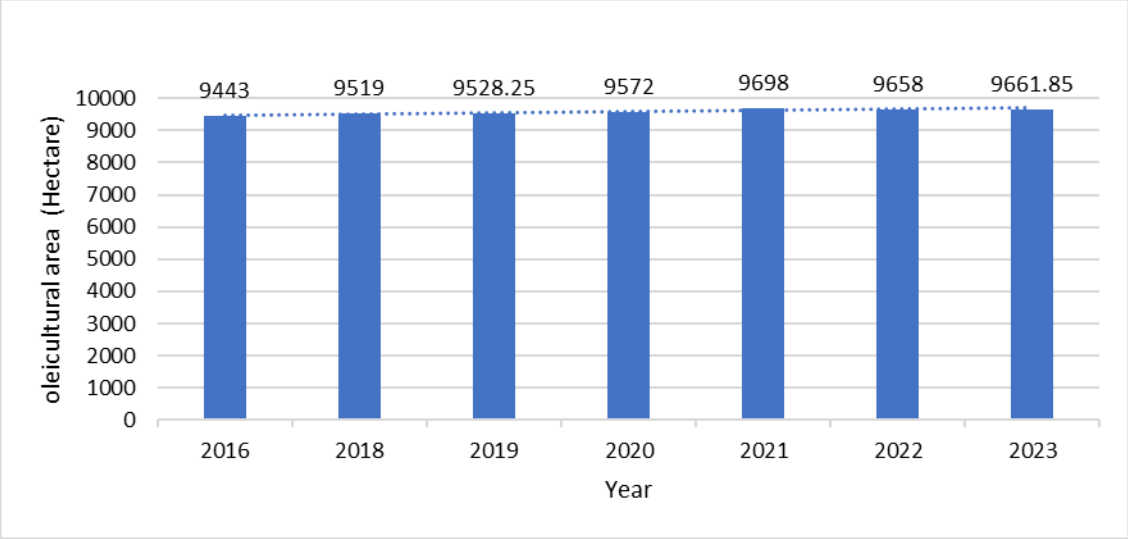

Fig. 2: Evolution of olive-growing area in the study zone. (Authors' calculations based on DSA data, 2024).

3.2 Production and yield:

Despite stable acreage, production is unstable. With the exception of a modest increase in 2022, production is steadily declining, in parallel with falling yield levels. The following figure shows the synchronization between the two dimensions.

Fig. 3: Evolution of olive-growingproduction and yield inGuelma(Authors' calculations on the basis of DSA-Guelma, 2024).

3.3 Socio-economic characteristics of household heads:

According to the results of oursurveys, 50.80% of household heads are over 60, with only 20.30% having family members who work the land, which poses real obstacles to the sustainability of its actions for future generations. Based on the surveys, 91.50% of interviewees are married, with men accounting for 98.30%. We found that the representation of women in these projects is modest, which is linked to the traditions and cultures of these regions. With regard to the level of education of heads of household, 64.5% have attended formal schools, with 22% at primary level, 27% at intermediate level and 13.60% at secondary level. On the other hand, only 18.6% of farmers had undergone agricultural training, in particular in the technical management of olive groves.

The size of the households surveyed was around 5 to 7 people, with 49.20% and 33.90% having a household size of over 7. This is in line with the average household size in Guelma's rural areas, which was 5.5 in 2008.

Based on the surveys, village residents account for only 40.70% of respondents, despite the fact that 78% of households work in the village.

It should be pointed out that 89.8% consider farming to be the main source of income, combined with other sources, notably retirement pensions (35.60%). 61.00% of local residents claim to have farmed from generation to generation.

Alongside olive growing, livestock farming is practiced by 54.20% of them. Herbaceous crops are represented by cereals (69.50%), food crops (18.60%) and arboriculture (10.20%).

Table1: Socio-economic characteristics of household heads linked to project success:

Criteria	Scale	Percentage	ddl	P value
Age of head of household	<60	49.2	1	0.519
	>60	50.8		
Size of the household	<7 or equal	64.4	1	-,518
	>7	35.6		
Level of education of head of household	Illiterate	18.6	5	0.494
	Coranic school	16.9		
	Primary	22		
	Middle	27.1		
	Secondary	13.6		
Agricultural training	Yes	18.6	1	0.234
	No	81.4		
Local residents	Village	40.7	1	.020*
	Outside village	59.3		
Monthly income (Algerian Dinar)	0 -18000	6.90%	4	0.861
	19000 – 24000	17.20%		
	25000 – 50000	43.10%		
	>50000	15.50%		
	Unstable income	15.50%		
Member working the land	Yes	20.3	1	.048*
	No	79.7		

* Correlation is significant at the 0.05 level. **. Correlation is significant at the 0.01 level.

The statistical treatment of the correlation with success(Table 1),the sample studied indicated that certain indicators are not factors associated with the success of the plantation. We can mention the level of education, which corroborates the results of Bouchakour in 2020 [16], who found that the level of education seems not to favor agricultural productivity.

On the other hand, certain indicators such as place of residence and family members practicing agriculture are correlated with project success at the 0.05 level. This result is consistent with the work of Rouibah in 2022, who confirmed that rural farmers chose to invest in plots close to their homes to better care for their olive orchards.

3.4 Characteristics of olive groves:

Within the framework of the PPDRI, Guelma has benefited from 2082 ha of olive plantations, with an average of 1.5 ha/Beneficiaries, distributed over the different Communes.

The variety grown is 100% Chemlal, a hardy variety of Algerian origin, but 61% of those surveyed said it was not adapted to the region and was not profitable. These observations were confirmed by those involved in the Forest Conservation Department, who confirmed that this comment was taken into consideration when new programs were implemented, with a mix of varieties, notably Guelma blanquette.

The survey revealed four types of cultivation system, depending on density and the presence or absence of irrigation (Table 2).

Table 2: Classification of orchards into systems (according to CIO classification, 2015[17]).

	Traditional rain-fed system	Traditional irrigated system	Semi-intensive rain-fed system	Semi-intensive irrigated system
Percentage	71.2	22	5.1	1.7

Tree density, ranging from 50 Trees/Ha to 300 Trees/Ha, of which 76.3% have a density of 100 Trees/Ha.

On the question of sustainability, the results indicate that 93% of local residents own olive groves, despite the fact that the survey is specific to the beneficiaries of olive plantation projects. This is explained by the loss of olive groves which, according to the interviews, is mainly caused by:

Lack of water resources at the start of planting caused the trees to die at a very young age. The age of the trees (7 to 14 years), and the very short production period varies from 1 to 6 years.

Other causes include the fires that ravaged several orchards in Hammam Nbail and Bouati Mahmoud in 2021. In addition to extreme temperatures during tree flowering.

The results of the survey showed that the success rate of the projects is 52.50%, in addition the bivariate analysis for the factors related to the success of the projects according to the respondents are summarized in the table:

Table 3: factors linked to successful olive tree planting

Criteria	Scale	Percentage	ddl	Sig
Materials required	Yes	87.9	1	.035*
	No	12.1		
Adapted variety	Yes	62.1	1	.002*
	No	37.9		
Rainfed or irrigated	Rainfaed	76.3	1	0.827
	Irrigated	23.7		
Harvest destination	Consumption	47.4	2	.000**
	Consumption and investment	31.6		
	No production	21.1		
Satisfactory income	Yes	37.5	2	.000**
	No	56.2		
	Partially	6.2		
Improved standard of living	Yes	44.1	2	.000**
	No	37.3		
	Partially	18.6		
Orchard area (Ha)	Mean	2.07		0.093
(quantitative)	Standard deviation	1.88		
Yield	Mean	7.98		.029*
(Quantitative)	Standard deviation	7.267		
Density	Mean	107.68		0.594
(Quantitative)	Standard deviation	37.449		
Year of start of production	Mean	2.63		.023*
	Standard deviation	1.28		

* Correlation is significant at the 0.05 level. **. Correlation is significant at the 0.01 level.

On the other hand, technical factors linked to project success (Table 3):

Improved standard of living, satisfactory income, destination of harvests, are linked to project success at the 0.01 level. In parallel, adapting the variety to the region and matching the olive tree to demand are correlated with success at the 0.05 level.

The relationship between irrigation management and project success is not proven, since olive trees are not very demanding in terms of water. As far as orchard size is concerned, we have found that there is no link with project success, because some small orchards have very high yields.

4 CONCLUSION:

In conclusion, the olive sector in Guelma is in decline. It requires urgent action to address the steady decrease in yields and production, which threatens the economic viability and sustainability of olive plantations and the future of farming households in general. What's more, the PPDRI plantations are only half successful, and cultivation remains traditional with limited mechanization, which can be the cause of fluctuations in production and yields.

To deal with this situation, and according to our study, we propose several recommendations:

- Modernization of production methods, training and mechanization of cultivation practices are more than a necessity.
- In the rural areas surveyed, the mobilization of water for irrigation, especially in times of drought, should be considered. Even for the extension and establishment of new development projects, watering is vital, especially during the first years after planting.
- Take more measures to prevent the impact of summer fires.
- Choosing the right varieties for the region, especially considering the impact of climate change.

Finally, this initial study needs to be extended to other regions and supplemented by technical studies directly linked to the intrinsic factors of olive trees, in order to increase yields and find technical solutions in parallel with socio-economic interventions.

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