

IDENTIFICATION AND ANALYSIS OF CONSTRAINTS LINKED TO THE INTRODUCTION OF OILSEED CROPS IN ALGERIA. THE CASE OF RAPESEED IN THE WILAYA OF SKIKDA

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ABSTRACT

The aim of this study is to examine the to introduce rapeseed as an oilseed crop in Algeria, using the Wilaya of Skikda, in north-eastern Algeria, as a geographical focus and identifying the constraints facing this crop as a priority objective. This work is spread over two consecutive agricultural seasons (2021 and 2022), during which we carried out field surveys with farmers and professional and technical support organisations, mainly responsible for guidance and extension. These surveys enabled us to build a database which we analysed and dissected to highlight the current situation of this project, its progress and the stages of its implementation with the participation of all the stakeholders concerned and involved. In this respect, 31 farmers were questioned using questionnaires drawn up for this purpose, targeting those in 2021 and those in 2022 so as to be able to monitor and evaluate this project of great economic importance for Algeria, which wants to reduce at all costs the imports of oilseeds that cost the state a lot of money.

Our findings revealed that this highly promising project contains a number of shortcomings and imperfections hampering its success and its implementation in time and space. These are technical and agronomic constraints, as well as institutional and administrative ones, which have meant that projects to introduce rapeseed cultivation in the Wilaya of Skikda are now under threat of abandonment by the farmers and investors who rushed to sign up to the project. Our investigations have shown that the project was carried out in haste, without a prior study being carried out and without the human and material resources being made available to the farmers to bring this project to a successful conclusion, which is now sinking into confusion.

Keywords: Cropping system, Rapeseed cultivation, Crop management, Agricultural extension, Cultivation technique, Technical itinerary.

I. INTRODUCTION

Algeria is one of the developing countries with a significant deficit in edible oils, as national demand is clearly increasing, which is having repercussions on the volume of imports and increasing the food bill, despite the considerable increase in national olive oil production. In recent years, international prices for vegetable oils have soared by around 200% over a two-year period (USDA, 2007). The origins of this rise are attributed to the strong economic growth in China and India, which is leading to changes in the eating habits of the populations concerned (Chalmin P, 2007).

All oilseed markets are facing a dizzying rise in prices. Soya oil, for example, has risen by 16.5% since the beginning of April on the US market. Rapeseed is over €1,000 a tonne, an all-time record. "On our markets, all oils are interchangeable, or almost. It is therefore normal to see a general rise in prices", observes Antoine de Gasquet, Chairman of Baillon-Intercor, a brokerage firm specialising in oils and fats (Haverland A, 2022). This was compounded by unfavourable weather conditions in the main oilseed-producing countries. The return of El Niño has affected rubber and oil palm plantations in South-East Asia (Chalmin, 2007).

At the same time, Algeria is experiencing a major shortage of edible oils and oilcakes. It can be predicted that, to keep pace with growing demand, imports will continue to rise, despite the potential increase in local production. The main oil produced is olive oil. But the country remains heavily dependent on imports to supply the domestic market (Benassi and Labonne, 2004). Any fluctuation in international prices ipso facto has an impact on the Algerian market, which is 100% dependent on the international market. In recent years, the national vegetable oil market has been marked by a rise in prices as a result of world prices and import taxes (CNIS, 2007).

Most of the refined oil sold in Algeria is produced locally from imported crude oil. The cost of these imports to Algeria has exceeded US\$700m (CNIS, 2007). Such a massive reliance on imports is a clear indication of Algeria's level of dependence on the world food market. Food availability of oil per person per year in Algeria has increased from : 10 kg in 1968, to 16 kg in 1980, then 17 kg in 1988 and 18 kg in 2005 (Matallah M, 2021).

The rise in the price of vegetable oils on the national market has prompted private manufacturers to think about crushing imported oilseeds, which could solve the problem of rising prices and meet the needs of the Algerian market. On the other hand, the price of imported seeds depends on world market prices, which is not a definitive solution, as it does not fully address the two complementary aspects of the problem, i.e. rising prices on the domestic market and reducing the food bill through other alternatives, whether importing oils or seeds for crushing.

To meet this growing demand for vegetable oils, the Algerian authorities have tried to develop industrial agriculture by introducing oilseed plants to reduce imports and help the national industry. For this reason, the introduction of rapeseed cultivation is an idea that reinforces the national policy of developing the agri-food industry, based on rapeseed varieties that adapt to Mediterranean bioclimatic levels (coastal areas). Rapeseed is the second most important oilseed produced in the world, with 60.7 Mt in 2019-2020, well behind soya, at 338 Mt, and ahead of sunflower at 56 Mt. In 2020, world production of winter and spring rapeseed is estimated at 69.8 Mt, up from a downward

trend since 2017. According to the International Grains Council, world rapeseed and canola production should reach 73.5 million tonnes in 2021-2022.

In the European Union, for all uses combined, 9.5 million tonnes of rapeseed oil were consumed in 2013 - 30% of all vegetable oils used in Europe. Worldwide, 25 million tonnes of rapeseed oil are consumed every year. The Chinese are the 2nd largest consumers after the Europeans, with a total of 6.5 million tonnes (FAO, 2020).

It should be emphasised that this type of agriculture is of economic importance in supplying vegetable oils in order to reduce the import bill. It is also important in terms of agricultural waste, since it is considered to be a protein-rich food, as well as contributing to the resistance of parasitic weeds and increasing cereal production yields.

According to Decision No. 616 of 13 July 2014, amended and supplemented, setting the conditions of eligibility for support on the special allocation account No. 302-139 entitled "National Fund for Agricultural Development", line 3 "regulation of agricultural production". Which makes clear the Main stakeholders in the project to introduce oilseed rape and those responsible for crop monitoring-evaluation and also the varieties used. (JORADP, 2014)

This first experiment in growing rapeseed was carried out in four wilayas in eastern Algeria under the supervision of the ITGC Technical Institute for Field Crops, which obtained satisfactory results of over 20 q/ha, under the supervision and guidance of a team of agronomic engineers. According to experts familiar with the field, Algeria can grow an area of up to 500 thousand hectares of rapeseed and cover its needs by 2024. (MADR, 2022)

The first trials were relaunched during the 2020/2021 season, targeting a number of areas along the Algerian coast. According to data from the Ministry of Agriculture and Rural Development, the first experiment with rapeseed cultivation in the 2020-2021 agricultural season was successful, with encouraging results. To date, total production has reached 13,935 q, including 11,397 q of cereals for processing, as well as 2,538 q of seeds which are stored at the Cooperatives for Cereals and Pulses (CCLS) (MADR, 2023).

The national trend is to obtain an average production yield from 32 and 38% oil, with a large proportion of the remainder destined for animal feed, but last season we achieved 42% oil in an experiment (ITGC, 2022).

Drought has considerably affected yields and forced farmers to rely on irrigation, whereas extending the area under oilseed rape inevitably results in good yields (ITGC, 2022). To implement this programme, the government has supported and promoted rapeseed cultivation in several Wilayas, including Skikda. Unlike highland areas, which are affected by periods of rainfall shortage, that has a direct impact on production and yield levels, coastal areas, and specifically the Wilaya of Skikda, are more or less spared from water shortages, making these agricultural areas suitable for this crop, achieving considerable yield levels.

Rapeseed has been introduced in the Wilaya of Skikda for the 2020/2021 crop year, in the Commune of Sidi Mezghiche, with 03 model growers covering a total area of 03 hectares. Production from this first experiment was 58 qx, giving a yield of 19 qx/ha, which is not insignificant compared with the yield recorded in the Wilaya of Sétif (high plateaux), which was around 15 qx/ha (ITGC, 2022), despite the water deficit recorded during the same season. For the 2021/2022 crop year, the experiment has been extended to 09 other Communes in Skikda, covering an area of 349 ha spread over 62 growers. The choice of the Wilaya of Skikda for the development of rapeseed growing and its promotion is not without constraints hampering the implementation of this new trend, whether in terms of implementation processes in the field or techniques relating to the monitoring and management of the crop on the farm.

This observation leads us to question the reliability and feasibility of the support and supervision measures put in place in the field to ensure the successful introduction of rapeseed growing in the Wilaya of Skikda. Questions also need to be asked about the state of the crop during the two campaigns in which it was introduced and its future development prospects. Finally, what are the constraints linked to its development and success in the Wilaya of Skikda, considered from a climatic and edaphic point of view to be favourable?

Aims of the study :

Our study aims to

- Evaluate the success rate of the rapeseed introduction project in the wilaya of Skikda.
- Analyse the cohesion of farmers in this new project and identify the constraints facing the project.

2. Materials and methods

2.1 Presentation of the work methodology :

Our work methodology is divided into two parts, one complementing the other. There is a bibliographical and documentary research part ,and a field part based on surveys with farmers and local stakeholders.

2.1.1. Choice of the Wilaya of Skikda

We chose the Wilaya of Skikda due to its territory, which is considered favourable for growing rapeseed, that adapts to climatic and edaphic conditions. In other words, the wilaya of Skikda is endowed with fertile land and numerous pilot farms as well as model farms that have volunteered to adopt this crop on their holdings.

Skikda's agricultural sector has a favourable technical and scientific environment capable of supporting the project to introduce rapeseed cultivation, such as the University of 20 August 1955 and its research laboratories, the ITAFV, the specialised vocational training institutes, and the extension services of the Agricultural Services Department, considered to be among the best in Algeria.

2.1.2 Zoning

We selected the geographical area for the survey by targeting all the Communes selected for the promotion of this crop, using data provided by the Skikda agricultural services. This crop is present in 09 municipalities, namely (map):

- Ramdane Djamel , El Harrouch , Emdjez Edchich .
- El-Hadaeik , Tamalous , Sidi Mezghiche .
- Azzaba , Ain Charchar and Salah Bouchaour .

The number of producers who have adopted rapeseed cultivation has risen from 03 in 2020 to 62 in 2021, 59 of whom have had initial experience of this crop. We selected a sample of 30 farmers to be surveyed, i.e. 50% of the total, using a questionnaire drawn up for the purpose. Drawing up a sample of 30 farmers to be surveyed involved several stages:

a. Sampling :

The constitution of our sample required the following criteria to be taken into account:

- The size of the farm,
- Model farmer growing oilseed rape, including new farmers, - The varieties of rapeseed grown (Lidea, Invigor and Trapper).
- Have an area of more than one hectare.

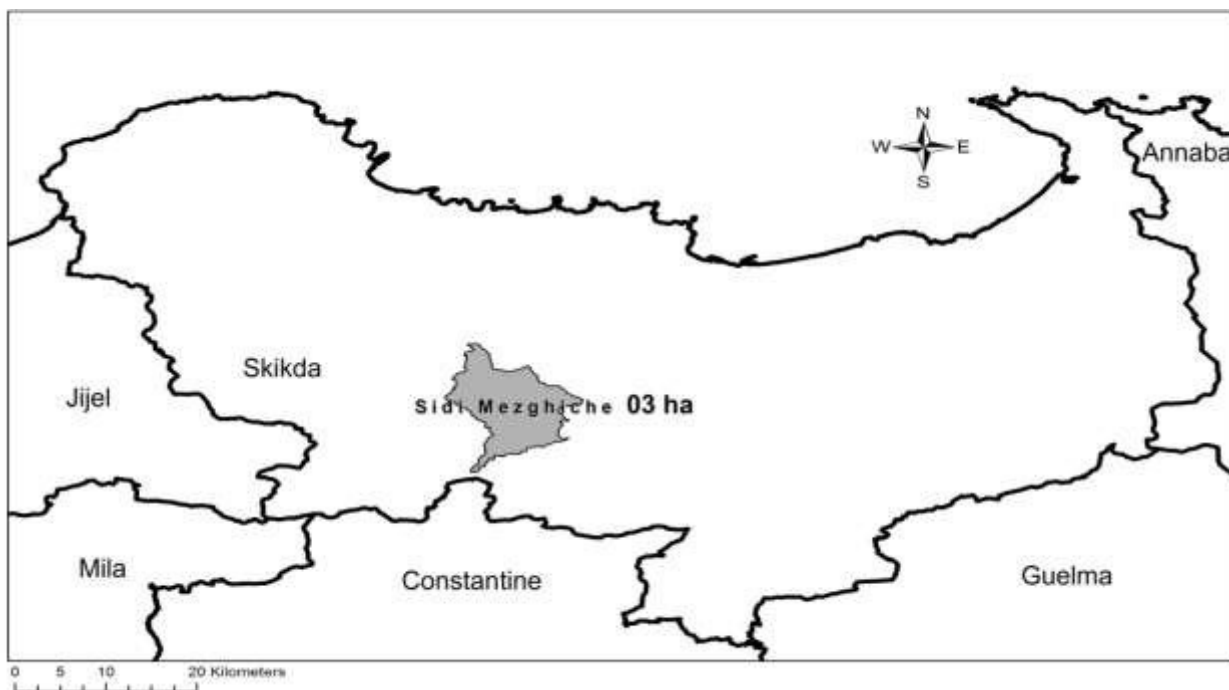


Figure 1: Rapeseed farm areas in the Wilaya of Skikda (2021 crop year)

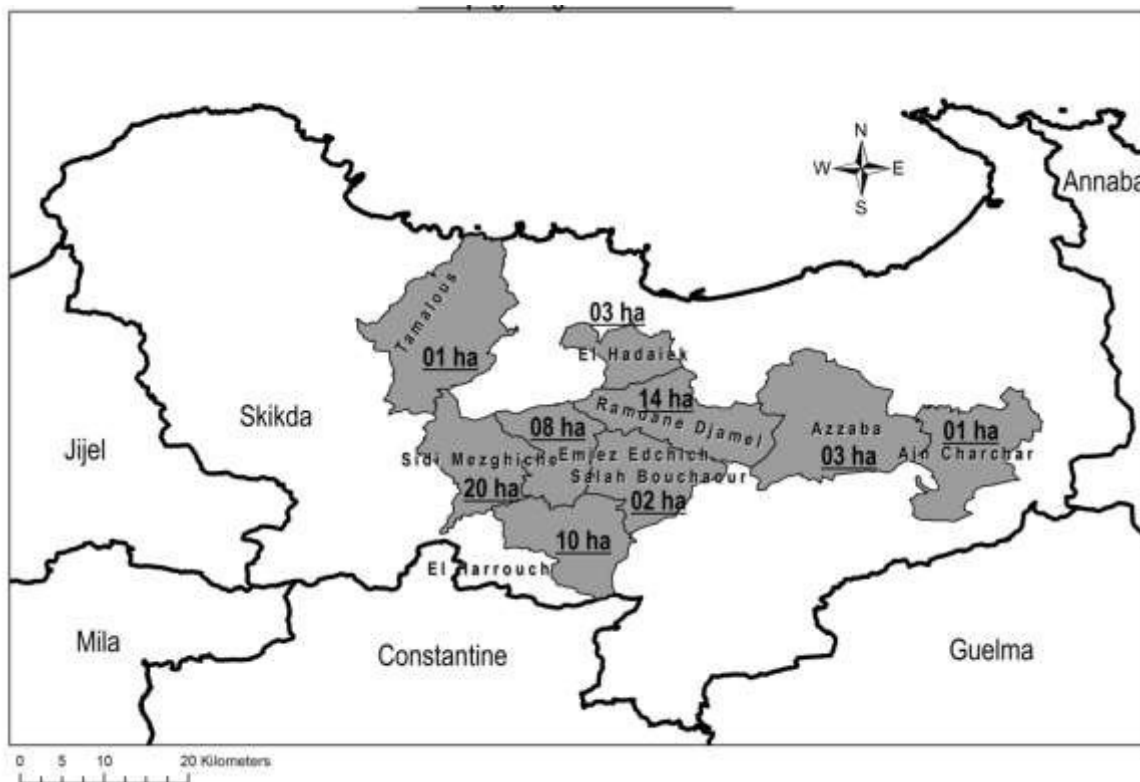


Figure 2: Rapeseed farm areas in the Wilaya of Skikda (2022 crop year) b. Survey method

The survey was designed to detect farmers' cohesion in this project, including their choice of variety, compliance with the technical itinerary, monitoring of threats to the crop and constraints on production levels and yields. The approach we have adopted is divided into two stages:

Stage 1

Involves conducting administrative interviews with professional bodies and development structures, namely: the Agricultural Services Department, the Interprofessional Cereals Office, the Cereals and Dried Vegetables Cooperative, the Chamber of Agriculture and the agricultural extension services at the level of the subdivisions of each Dairate.

2nd stage

Field surveys were carried out with farmers on their farms in order to gain a better understanding of the overall situation of the plot from a technical and agronomic point of view, and to identify the various constraints facing this new crop at plot level and in relation to the socio-economic environment. A questionnaire was drawn up for this purpose.

3rd stage

This stage consists of analysing the results of the interviews with the supervisory bodies and the survey of farmers. This survey brought out real data from the situation in the field, which was analysed and processed before being discussed. The sequence of our results is in harmony with the discussion in order to respond to our initial problem.

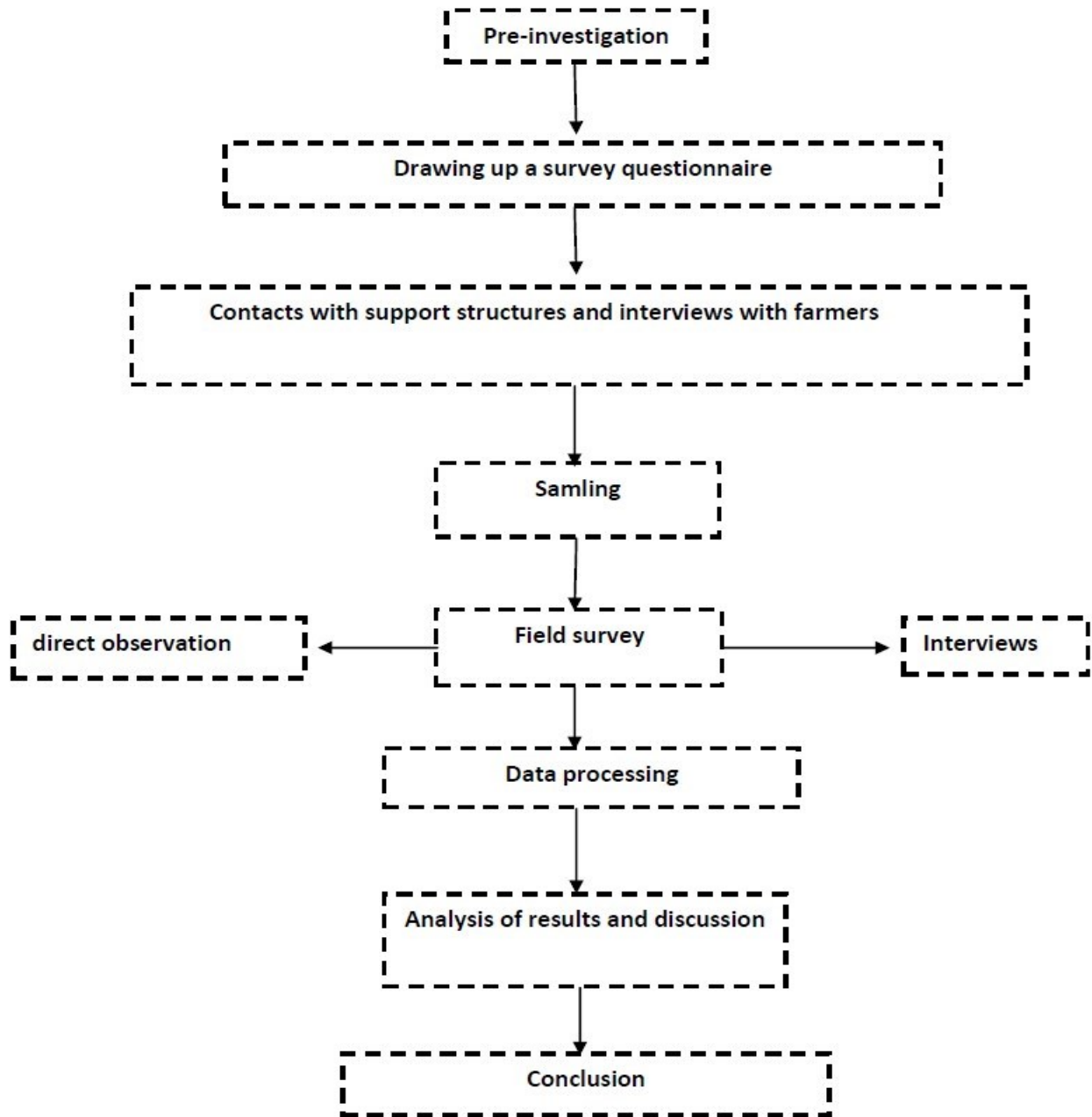


Figure 3: Summary of the work methodology 3. Results and Discussions

3.1. Identification of the farmer and his farm

Figure 4 shows that rapeseed farming is managed by a middle age group, as 47% of our survey sample are between 40 and 60 years old. Young farmers under 40 years old account for 33%. This class is the most active in carrying out the various cultivation operations that require physical presence and involvement throughout the crop cycle. On the other hand, the oldest farmers, those over 60 years old, represent only 20%. It should be noted that all the farmers in our survey sample are male.

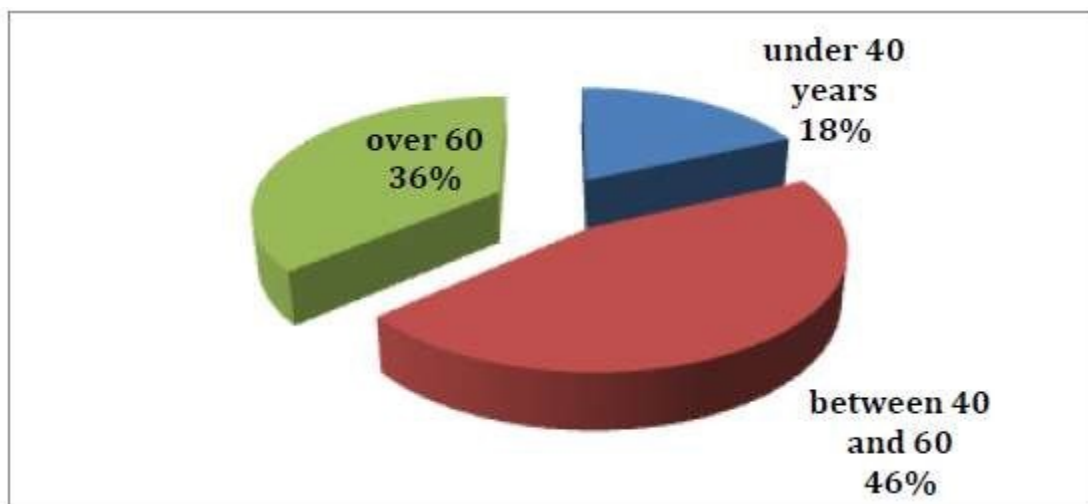


Figure 4 : Different age classes

Figure 4 shows that the most dominant class is the secondary/university level, with a share of 60%. This category is able to apply new agricultural techniques and to modernise farming practices by introducing high-performance technology. Those with primary education account for 37%. The illiteracy rate is non-existent among the farmers in our survey sample.

The youngest farmers (under 40 and between 40 and 60) are more educated. The level of education is, therefore, inversely proportional to age.

It should also be noted that 24 farmers surveyed were under 60, 56% of whom were university graduates in the over-60 age group, and 6% were university graduates. In any case, all the farmers in our survey sample are educated, but at different levels between primary and secondary school. As a result, we note the total absence of illiterates among the farmers surveyed.

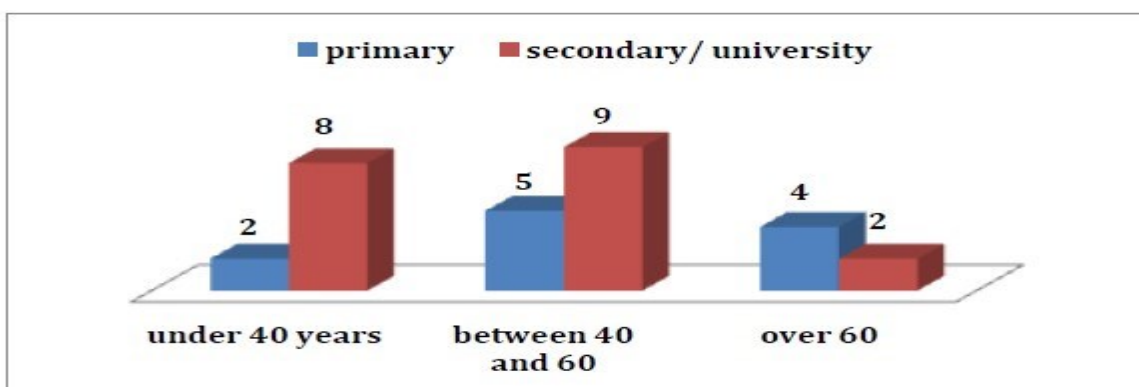


Figure 5: The effect of age on education levels

3.2. Means and factors of production used

3.2.1. Land

"According to economists, the company is the dynamic pole of productive activity. Land ownership, on the other hand, would be rentier in principle, passive and external to production. Thus, the economists have always emphasised the advantage for farmers of renting land rather than owning it: this solution would avoid adding two different functions. One is productive and the other is a source of income, and would reserve all the financial resources for the former. The development of the agricultural enterprise would gain just as much". (Barthelimy, 1985)

In our case, land ownership in this type of project is a key factor in the success of the policy to introduce rapeseed growing in Algeria, given that more than half (53%) of the growers we interviewed own their land, which is a positive indicator for the success of rapeseed growing. The fact that growers own their farms (agricultural land) both reduces production costs and increases the chances of success for this project, which the authorities are counting on enormously to open up new agricultural prospects in the agri-food sector.

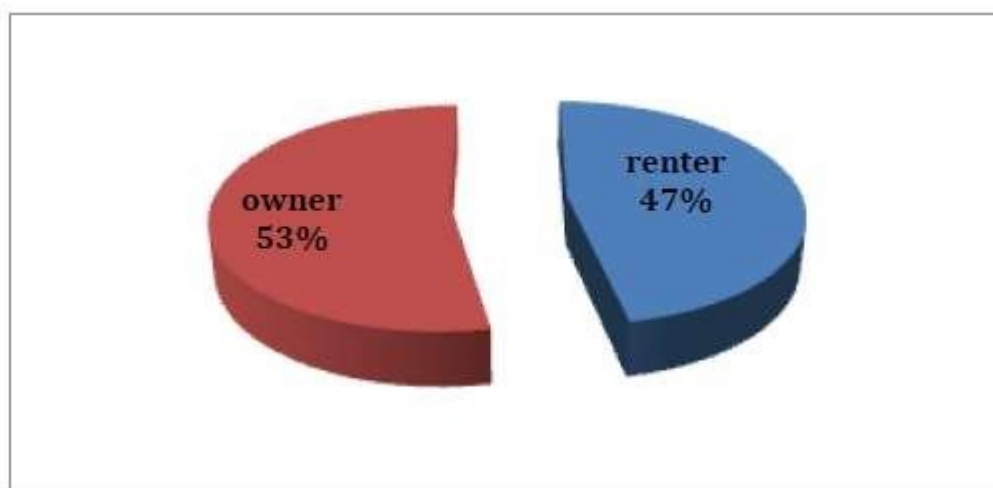


Figure 6 : The property aspect of farms

"As there is little incentive for farmers to invest in the long-term health of leased land, it is generally not subject to many practices aimed at increasing the health of its soil; soil fertility may therefore decrease and erosion increase (McDonald, 2013; Rotz, 2016; Sklenicka et al., 2015; Wu, 2008). Possible reasons for this trend include short-term leasing arrangements, lack of written leases, rising rents and competition in the rental market" (Rotz, 2016).

The leasing of land in this type of project is dominated primarily by investors who are interested in seizing the opportunities and benefits of the project. This is why the number of tenants is quite high. As a result, farmers' attachment to this project could become a major issue, casting doubt on the whole project in the coming years.

3.2.2. Frequency and trend of rapeseed growers and their method of farming

Figure 7 shows that only 10% of the farmers surveyed had two years' experience of growing rapeseed, while the rest (90%) were trying for the first time. This means that the majority of farmers lack the experience in managing rapeseed fields and in techniques relating to crop management, protection and irrigation. Indeed, this is an indicator that could become a major constraint if the agricultural extension and support apparatus is not available to aid the producers. On the other hand, it should be pointed out that the 10% of growers who have more than one year experience of growing rapeseed all started in 2021 and remain committed to the crop and the support measures provided by this project.

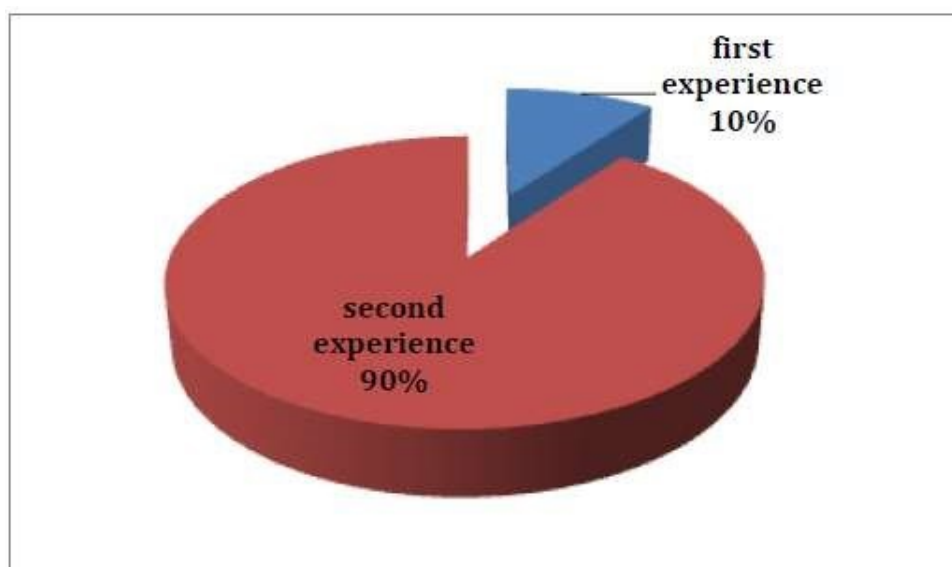


Figure 7 : Farmers' experience of growing rapeseed

"In almost the South countries, supply and demand for agricultural financial services do not match, either in terms of volume or type of service. For financial institutions, the risks (climatic hazards, plant and animal diseases, price volatility, and lack of collateral) often seem too high to respond sustainably to loan requests. On the borrowers' side, any production hazard may result in difficulties repaying loans and in the need to draw on their assets, at the risk of losing complete control of their working tools". (Audrey Brulé-Françoise, Benoît Faivre-Dupaigre, Bernard Fouquet, Marie-José Neveu Tafforeau, Caroline Rozières, Claude Torre. 2016).

"Agricultural credit faces three types of risk: operational risk, market risk and credit risk. For the financial institutions involved in financing agriculture, the main cost is due to credit risk, which is particularly high and unpredictable in the agricultural sector. But we must not overlook operational and market risks, which undermine financial systems in countries with poor governance". (Audrey Brulé-Françoise, Benoît Faivre-Dupaigre, Bernard Fouquet, Marie-José Neveu Tafforeau, Caroline Rozières, Claude Torre. 2016).

With the financing system put in place by the Agricultural and Rural Development Bank, in particular the R'fig loan, which until now has been a reliable and credible financing and support instrument for farmers and investors, recourse to this financing system (bank loans) is recorded among 67% of rapeseed producers who have benefited from state subsidies in the form of bank loans (R'FIG), while

the remaining 33% are self-financing. R'fig credit is mainly used to support professionals and investors in the following areas

- Purchasing agricultural inputs needed for farming activities (seeds and seedlings, fertilisers, plant protection products.
- Purchasing feed for livestock (all species), watering equipment and veterinary medicines.
- Purchasing agricultural products for storage under the Agricultural Products Regulation System.
- Restocking or populating stables, small livestock buildings, and sheepfolds and stables.
- Restocking and repopulation of beehives by swarms.
- Carrying out cultivation work, ploughing, sowing and harvesting.
- Purchasing packaging for agricultural and agri-food products.

As a result, the rape-growing project has relied heavily on this instrument, which is essential for farmers wishing to take advantage of zero-rate credit, that is repaid after the harvest at the end of the crop year. (MADR, 2023)

According to Figure 6, a large proportion of the producers involved in the rapeseed-growing project in the Wilaya of Skikda have benefited from this credit. While 80% of them discovered this instrument through the promotion campaign conducted by the agricultural services and banking services. Skikda's agricultural services claim that, this project was accompanied from the outset by a number of measures to ensure its success and widespread use on farms with high potential production. Thus, unlike other sectors and crops, the R'fig credit and other bank support measures have found takers and customers only in the rapeseed growing project.

In addition, self-financing of farms represents 33% of our survey sample, which is a significant proportion, means that this category relies highly on its own resources. "Income from outside activities could explain the persistence of part-time farming in developed countries (Schmitt, 1991). However, the search fact help to finance investments on the farm, which would make farming more competitive and for additional resources outside the farm could also, as Brangeon, Jégouzo and Roze (1994) suggest, simply be a way of compensating for poor farm results". (Krebs, 2005)

Our survey reveals that out of the 33% who are self-financing as part of this project, 20% consider that recourse to a bank loan is unnecessary for strictly religious reasons linked to the interest that taking out the loan could generate, whereas in reality the loan in question is interest-free and is spread over a well-defined period. On the other hand, another 50% felt that they did not need financing to take out this bank loan, especially as the area under cultivation was not large enough, and at the same time hoped to increase the area under cultivation in the future. A further 30% felt interested to the bank loan, however, they refused to take it out for several reasons, essentially, linked to the complex and slow administrative procedures, whereas in fact, and after checking with the banking services during our survey work, it has been confirmed that loans are facilitated through a one-stop shop at BADR.

In this respect, we would point out that all the producers who have benefited from a bank loan are owners of their farmland. At the same time, none of the tenants of the farmland have taken out a bank loan.

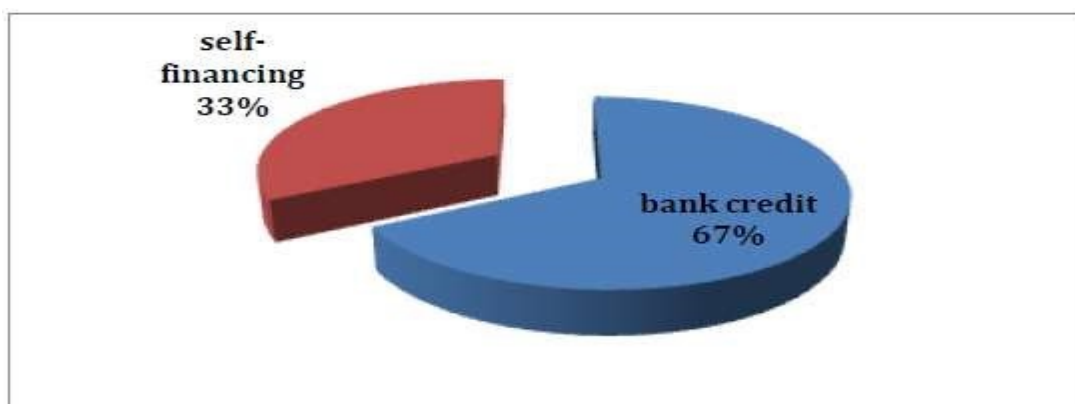


Figure 8: Funding sources

3.3. Main stakeholders

-Wilaya Agricultural Services Departments (DSA)

Supervising and coordinating all the activities of the oilseed production programme and setting up the control committee by decision; Monitoring, through the control committee, the application of the technical itinerary and estimating yields for each plot covered by the programme, and posting an information note on the programme two (2) months before the start of each marketing year at the DSA, agricultural sub-division and CAW offices; To inform the Ministry of Agriculture and Rural Development (DRDPA and DPVCT) in time, in case of issues that may affect the oilseed production programme; Transmit a weekly progress report to the Ministry of Agriculture and Rural Development (DRDPA) on the progress of the season.

- Agricultural subdivisions

To post an information note on the oilseed production programme two (2) months before the start of the season at the head office of agricultural subdivision.

To receive membership applications accompanied by their files and to process membership files as and when they are received; To forward the applications for the oilseed production programme to the DSA as and when they are processed, and to draw up the report of findings jointly with the CAW and CWIF; Invite the selected producers for the programme to sign the "producer/processor" contract as and when the application files are processed, and send the DSA a copy of the contracts signed by the producers as and when they are signed.

-Algerian Interprofessional Cereals Office (OAIC)

The OAIC, through its network of CCLSs, ensures :

- Supplying members with agricultural inputs (seeds, fertilisers, weedkillers and plant protection products).
- Programming and implementing sowing, crop maintenance and harvesting operations.
- Weighing and storing the produce delivered by farmers.
- Technical institutes such as the Institut Techniques des Grandes Cultures (ITGC) and the Institut Technique de Développement de l'Agronomie Saharienne (ITDAS) both provide support and technical monitoring for members of the oilseed development programme.

3.4. Control committee

Before crops are planted, the wilaya Director of Agricultural Services will set up one (1) wilaya commission by decision, made up of the representative of the agricultural subdivision with territorial jurisdiction, the CAW, the ITGC and the ITDAS for the southern wilayas.

The committee in question is responsible for:

- Monitoring application of the technical itinerary and estimating yields for each plot covered by the programme; Monitoring the reception of oilseeds and checks on processing units, with at least three (3) unannounced checks, in particular: The 1st week of the beginning of processing; During the peak of processing; At the end of the processing campaign.

3.5. Monitoring and evaluation

In order to monitor and evaluate oilseed collection and processing operations, the DSAs send the MADR (DRDPA):

A weekly summary report on the progress of the campaign (production, collection, processing and payment of farmers by processors).

A final summary report at the end of the campaign.

The MADR may carry out checks and assessments of production, collection and processing operations at producers and processing units.

Table 1. Oilseed production and integration premiums

Nomenclature of supported actions	Maximum amount of support per action	Definition	Specific conditions of eligibility
Production premium for oilseeds.	1,500 DA/q for individual farmers, pilot farms and economic enterprises. 2,000 DA/q for farmers organised in agricultural cooperatives.	Financial incentive for the production of oilseeds for agro-industrial processing.	Producers who are individual farmers or organised into agricultural cooperatives, pilot farms and economic enterprises. Participating in the oilseed crop development programme. With a production contract with a processor.
Integration bonus.	500DA/q	Financial incentive for oilseed processing.	Processing unit under contract with one or more oilseed producers.

Source: DSA, 2022

3.6. Agricultural extension training

The implementation of this project to introduce rapeseed cultivation in Algeria was supported by a number of accompanying measures: training and monitoring-evaluation.

In fact, training is the main factor in the success of the project, insofar as the crop is unknown to the farming community, which requires the intervention of the agricultural extension apparatus through the specialised institutions that the agricultural services have mobilised to make the practice of this crop accessible to all committed producers.

3.7. Training areas and themes

According to figure 9, almost farmers have benefited from agricultural training or an introductory course in rapeseed cultivation. It should be noted that training measures are carried out through extension and training days under the responsibility of the CCLS in close coordination with the ITGC. The training offered by these extensions and training bodies is essentially based on field demonstrations, incentives through the presentation of successful examples, and incentives and facilitation measures.

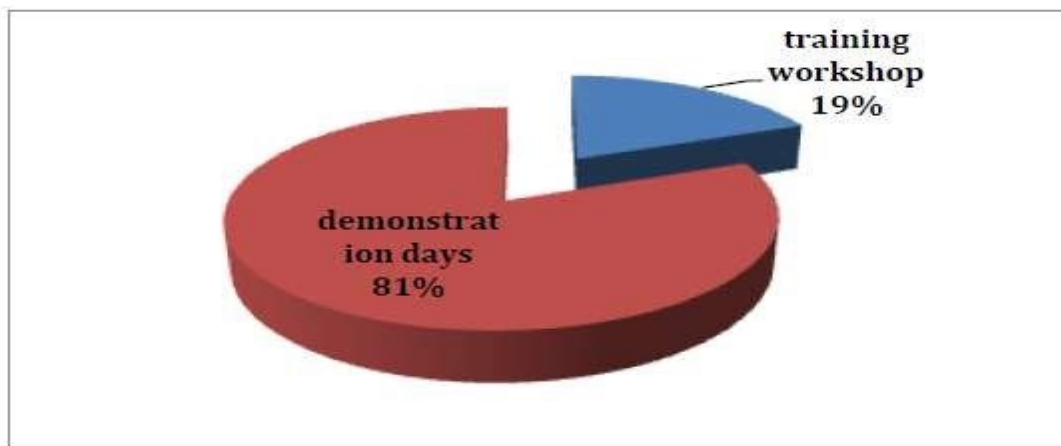


Figure 9: Type of training provided to farmers

The given training to farmers is essentially centred on advanced training courses, with 81% of all farmers (i.e. 50 of them) taking part, according to data collected from the agricultural services. These courses take place at CDC departments and technical institutes. On the other hand, those who benefited from demonstration days represented only 19% of all producers (i.e. 12 of them).

According to the agricultural and extension services data, these training sessions focused on the following topics: identifying the crop, working the soil, fertilisation, harvesting, phytosanitary treatment, varietal aspects and marketing. Figure 7 above shows the breakdown of training by action and by category for the total number of producers beneficiaries from training, which are around 62.

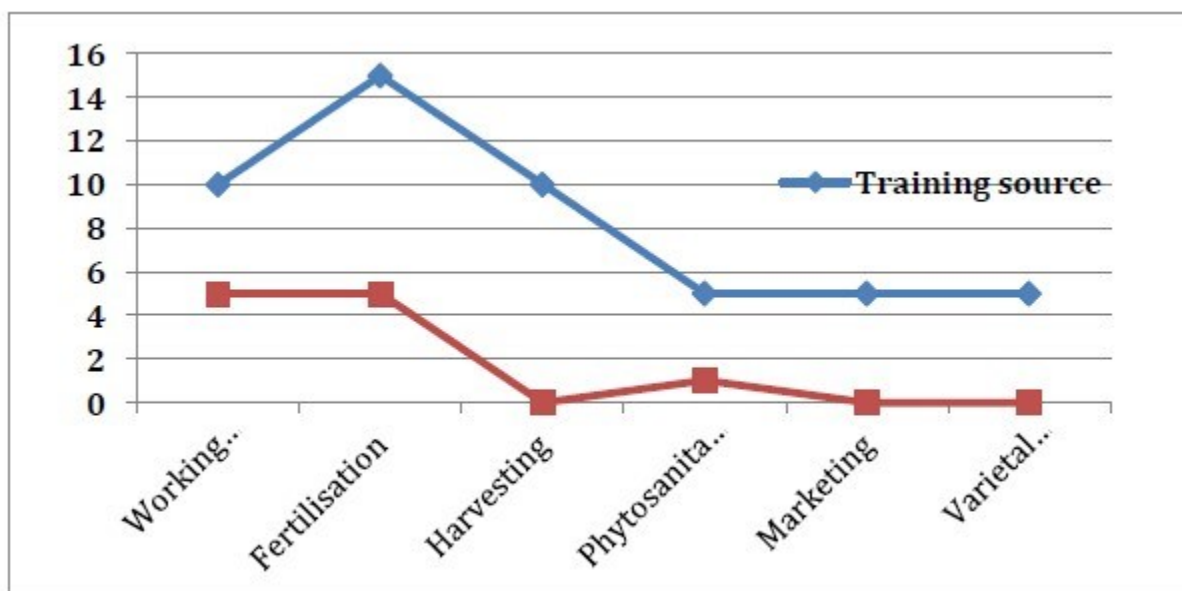


Figure 10: Types and focus of training for farmers

This figure, shows that the given training to farmers focuses mainly on three aspects linked to tillage, fertilisation and harvesting, with 25%, 25% and 16% respectively.

"The development of training content is ,most often ,the result of a compromise between the concerns and expectations expressed by farmers (male and female) on the one hand, (determined by the methodology used to generate them) and the expectations expressed by those commissioning the

training on the other hand, when these are different (project leaders, heads of organisations, etc.). For a training offer to be relevant, i.e. adapted to the environment in which it is deployed, it must recognise the knowledge and know-how of male and female farmers, which pre-exists the deployment of the training offer" (Hasnaoui et al, 2021).

The approaches that involve farmers 'at grassroots level' in expressing their expectations with regard to training require considerable resources, but they also guarantee the relevance of the training content that will be developed. At this stage, however, these approaches raise the question about the needed resources to develop training on a wider scale. (Hasnaoui et al, 2021)

From the figures, which we have retained from the accompanying training provided by the technical services, the adopted approach contains several gaps and imperfections linked essentially to itself and to the hoped-for aims, since concentrating on themes without the other complementary aspects could jeopardise the project in its entirety. In addition, it appears that this training was dictated and imposed on farmers without first setting up a consultation platform designed to increase farmers' acceptability.

Our surveys' figures show that the training was totally imposed in terms of time and space, but also in terms of content, which left some farmers feeling dissatisfied and hoping to learn more about aspects related to cultivation and its behaviour in order to improve their conduct. All of our survey sample stated that they had not been involved in the decisions relating to training and refresher courses.

The FAP methodology is defined as a training process, rather than an extension process, because it aims to go beyond solving immediate issues and seeks to strengthen participants' skills, so as to solve current problems but also, and above all, future ones (Baliteau et al, 2019).

3.9. Management and monitoring of the crop on the farm

3.9.1. Agricultural device

All the visited farms have the necessary farm machinery and equipment, such as tractors and hitched implements (for ploughing and crop management). Autonomy in terms of agricultural machinery and equipment is a fundamental element for the success of the oilseed crop project, however, they do not have specific equipment for oilseed crops and in particular rapeseed, which is a constraint for the grower who remains dependent on renting the desired equipment from the CCLS. This equipment essentially consists of a single-seed drill and a combine harvester.

According to 80% of the interviewed farmers, the fact of not having this equipment is a constraint that hampers the operation of the farm, especially during the semi-harvesting and harvesting periods, given the lack of equipment at the CCLS.

The periods when growers feel that this equipment is needed are mainly during the harvest, which can't wait. Any delay could cause huge losses in production and yield, but much less than the delay in the semi.

The reasons that led producers to do not have suitable equipment for growing oilseeds, especially rape, are essentially linked to the fact that the project is new and at an experimental stage, in addition to the scarcity of this equipment on the national market and its high cost, especially as the crop has only recently been introduced and is in an experimental phase throughout the country. On the other hand, 98% of the questioned farmers were ready to acquire the appropriate equipment for sowing and the various cultivation operations (single-seed drill), compared with 10% who said they were able and ready to acquire combine harvesters. At the same time, 60% of farmers want to make a collective purchase of the same equipment, while another 30% do not intend to acquire the above-mentioned equipment, relying on that of the CCLS, which has so far provided support and guidance to farmers. It should be pointed out that even the CCLS does not have specialised equipment, as they use regulated and modified cereal seeders, which could be a major constraint aggravating the situation of uncertainty prevailing among farmers.

3.9.2. Relationship of varietal aspect to cultivated area

Rapeseed varieties may have better nitrogen efficiency if, for the same nitrogen input, the crop yield is higher or if, for the same yield, the need for nitrogen fertiliser is lower. (Charbonnier, 2019)

The yield of autumn oilseed rape (*Brassica napus* L.) is subject to considerable variability over time and space. The average yield per hectare in Switzerland can fluctuate by 30% from one year to the next (23.9 dt/ha in 1994, 33.9 in 1997 and 36.7 in 2004) (Pellet, 2005).

The varietal aspect is crucial to the success of the project to introduce rapeseed cultivation in Algeria, since the requirements of the crop depend closely on each variety and its ability to adapt to the climatic and edaphic requirements of the environment. In the case of the Wilaya of Skikda, the climate is Mediterranean, so the varieties to be adopted in the Communes chosen for the crop must be in harmony with the Mediterranean climate, which is characterised by wet, rainy winters and hot summers.

The choice of variety is the first lever available for securing the harvest, limiting production costs and mitigating the environmental impact of the crop (reducing the IFT). It is also an important factor in crop establishment, yield development and the plant's ability to resist disease and pests. (FAO, 2021)

In our study, 70% of the farmers in our survey sample adopted and used the lidea variety 'Es hydromel', i.e. 21 farmers out of 30 interviewed. Figure 8 shows that the Trapper and inVigor rapeseed varieties are grown on areas of less than 10 ha. And the Es Hydromel oilseed rape variety is grown in all the different classes of area, with a high percentage in small areas of less than 5 ha. On the other hand, in large areas of more than 20 ha, all three varieties (Es Hydromel, Trapper and inVigor) are grown.

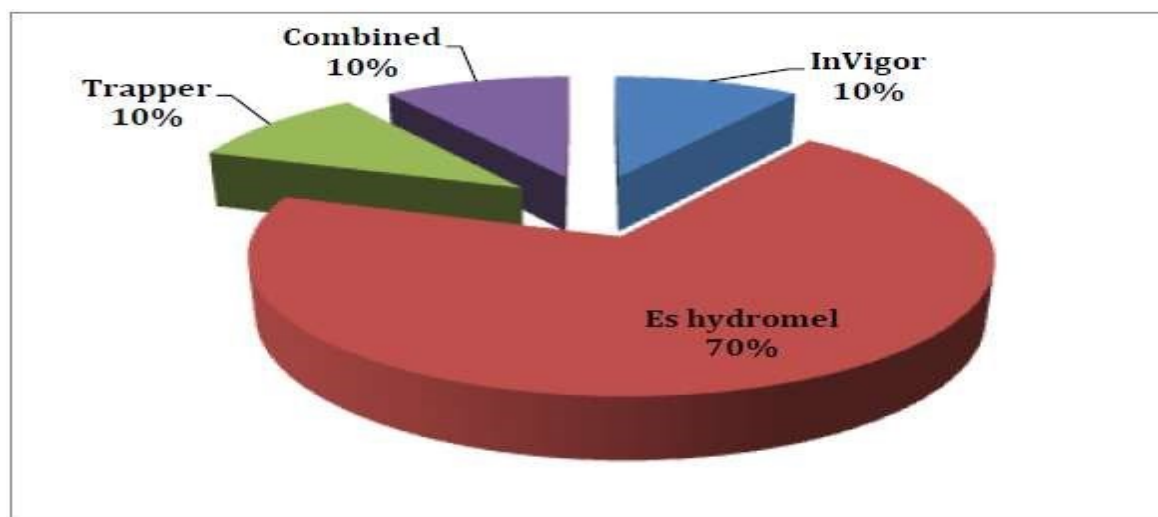


Figure 11: Varieties grown

"The variation recorded between the three sites is probably explained by the adaptation of the ES Hydromel variety to the environments studied during the growth stage.

adaptation of the ES Hydromel variety to the environments studied during the flowering stage. temperature, deep soils, good rainfall and less violent winds" (Mechatia and Belaroussi, 2022).

"The variety does not play the main role, but it does contribute to the protein content of the grain at harvest. But it is also important to ensure that the crop's nitrogen requirements are covered if yield, nitrogen efficiency and quality objectives are to be met... The choice of variety therefore contributes to the chances of achieving the protein objectives, although it cannot guarantee them. However, if differences in protein content between varieties are observed in trials, they are largely explained (50% of the variability observed between varieties) by the associated yield levels. (Arvalis, 2014)

As well as developing the crop's potential, with the hoped-for good emergence of the oilseed rape plants, the aim of good quality planting is for growers to achieve a dynamic autumn growth rate that will enable the rape to cope better with the risk of autumn pests, and in particular the dreaded flea beetles, against which chemical control is becoming increasingly complicated.

The climate in each region and the various agronomic practices will influence rapeseed growth dynamics, but also the choice of variety, which is an essential lever. The ability of oilseed rape to establish itself in the autumn is a key factor in making it more robust. It is therefore essential to select varieties with good autumn dynamics (initial vigour and high biomass before winter). (lgseeds, 2022).

3.9.3. Impact of the choice of variety

According to figure 12 below, the varietal aspect has a direct influence on the area devoted to rapeseed cultivation. In fact, the most widespread variety accepted by farmers is Es-hydromel, adopted by 21 of them with areas varying between more than 20 ha, which represents 1 grower, or 03% of the total surveyed, while those with less than 05 ha are in the majority, with a number of 10, or 33% of our survey sample. It should be noted that only 06% of the farmers questioned have an area of between 10 and 20 ha and at the same time grow the es-Hydromel (lidea) variety. Those with an area of between 05 and 10 ha account for 26%, but still grow the es-hydromel variety.

In this respect, the fact that the es-hydromel variety is dominant in the wilaya of Skikda is due to the fact that the preliminary studies and requirements for this crop have given farmers good impressions, in addition to the promotion carried out by the technical and extension services. This variety has demonstrated its adaptability and yield performance in the Mediterranean climate, as well as its resistance to disease. As a result, all the studies carried out in Mediterranean countries that have introduced oilseed crops, particularly rapeseed, recommend the Es-Hydromel variety for its performance in terms of physiology, yield and disease resistance.

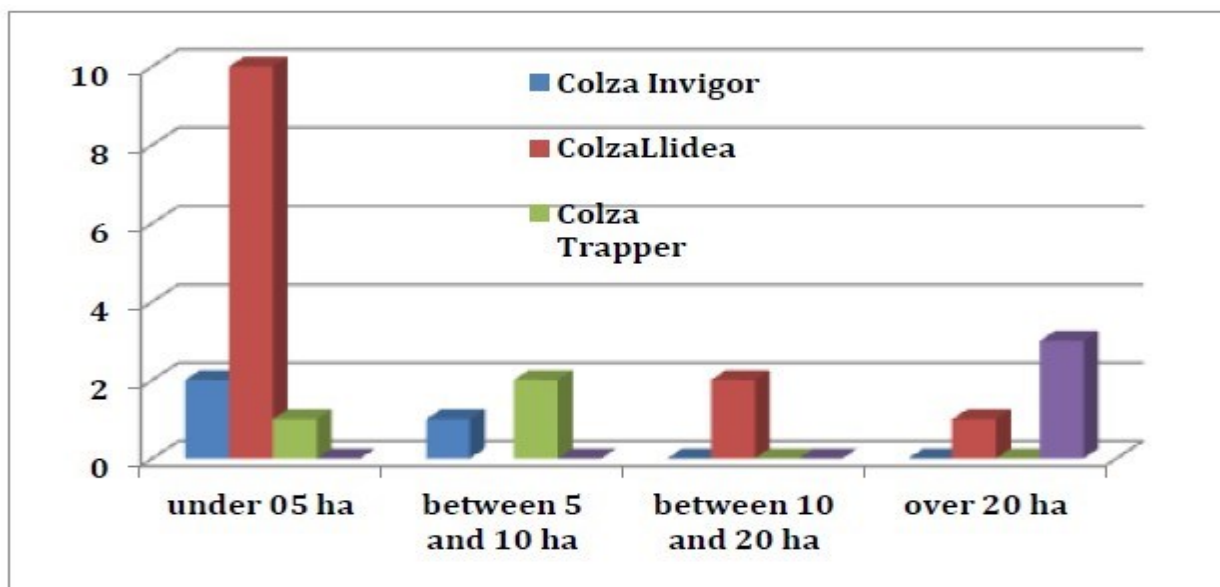


Figure 12 : Ratio of varietal aspect to cultivated area

3.10. Cultivation methods and practices

According to the results of our survey, 80% of farmers have benefited from agricultural advice and training on growing rapeseed, while another 20% say the opposite and justify this by the fact that the technical organisations have not done enough to ensure that everyone can benefit. In addition, this training is centred indoors rather than outdoors on demonstration plots.

3.10.1. Respect for the cropping calendar

Graph 13 shows that 56% of farmers who received agricultural advice respected the cropping calendar. On the other hand, 40% did not respect the cropping calendar despite the fact that they had received agricultural advice. In their view, adherence to the cropping calendar does not necessarily depend on training and extension, but on the availability of seed on time, even though seed is the exclusive responsibility of the CCLS, which is responsible for supplying producers. We would point out that 16% of farmers had a delay in sowing, i.e. 05 out of our total survey sample, including 04, or 13%, who had not benefited from agricultural training and demonstration training.

Knowing that 32% of those who benefited from agricultural training and demonstration courses recorded a delay in semi, which partly explains that the disruption noticed among farmers is not essentially due to a lack of knowledge of crop techniques and farm management, but rather for administrative reasons linked to the availability of seeds on time and the lack of commitment by the CCLS. Furthermore, the non-availability of seeds on the national market exacerbates the problem of

semi-timely availability, given that the monopoly exercised by the CCLS is a real constraint for farmers who have committed to this project, but also for future producers who wish to convert to this crop while waiting for the success of their colleagues before embarking on this new crop.

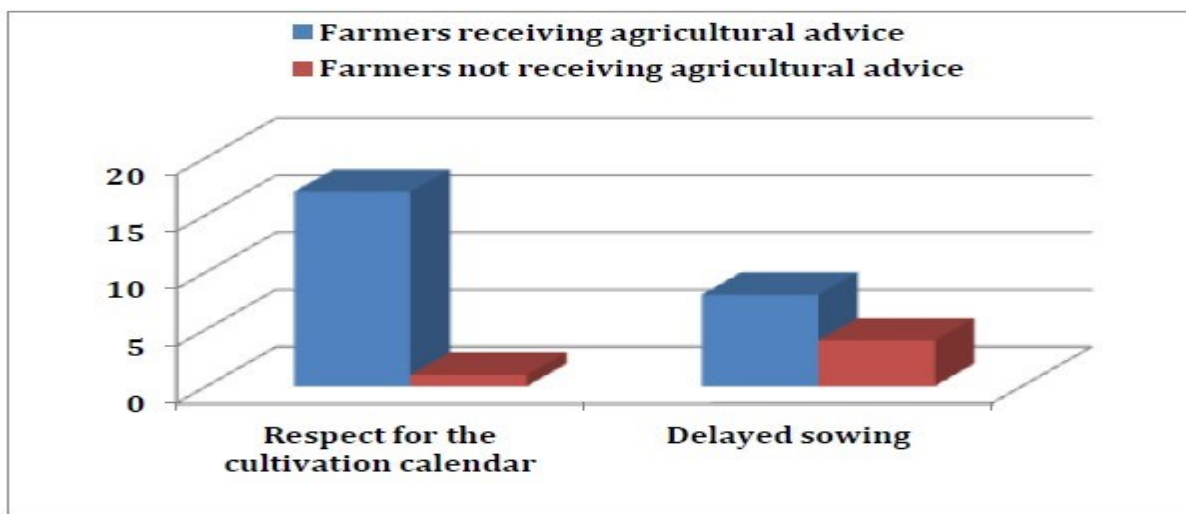


Figure 13 : Effect of the use of agricultural advice on compliance with the cropping schedule

3.10.2. Effectiveness of phytosanitary treatment against weeds

Figure 11 shows that the majority (69%) of farmers who have plots invaded by weeds. This category uses phytosanitary treatment against weeds as a major concern for farmers. On the other hand, only 25%, i.e. 08 farmers, had not been confronted with these weed issues, moreover, they had not resorted to phytosanitary treatment, contenting themselves with strictly preventive measures such as cultivation techniques.

According to the farmers who have complained about the weed invasion of their fields, the main cause is the fact that the necessary measures have not been taken into consideration to ensure that the sowing is carried out in favorable conditions. In addition , the training and demonstration courses focus mainly on cultivation, from sowing to harvesting, without going into any further detail.

As a result, the real issue lies in the supervision and relevance of the accompanying measures and the priorities to be addressed to ensure the success of the crops and the project in general. In this respect, the shortcomings we have noted are essentially linked to the effectiveness of the extension system put in place to bring this oilseed crop project to fruition.

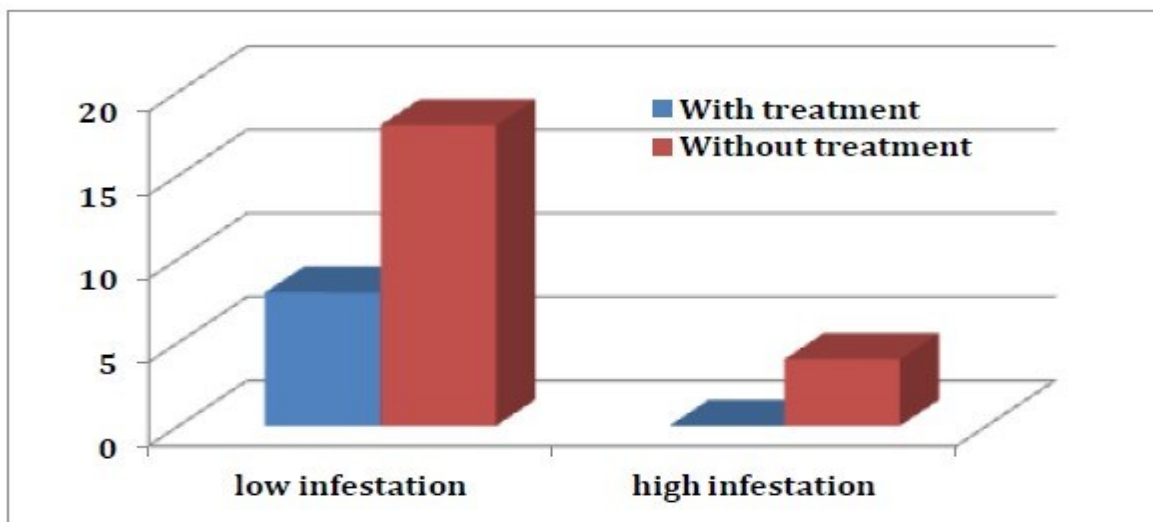


Figure 14: Relationship between phytosanitary treatment against weeds and its effectiveness

3.10.3. Other crop diseases and pests

In the scientific literature, several existent analytical studies, examine plant bio-aggressor relationships by manipulating few cultivation practices and considering only one crop pest (weeds, phoma or insects). However, it is by manipulating canopy-environment-pest interactions that we can influence pest attack levels (Christine Bouchard, Muriel Valantin-Morison, Gilles Grandeau, 2011).

Figure 15 shows that 48% of farms are affected by crop pests, with snails threatening 19%, flea beetles 16%, and aphids only 13%. On the other hand, 52% of farms are not affected at all by rapeseed pests and diseases.

Against this backdrop, farmers say that they have not learned techniques for combating pests and diseases as part of their training and demonstration courses. They even hope that these techniques will be demonstrated so that growers can intervene in time to protect their crops. In this respect, it should be noted that 80% of our survey sample would like pest control techniques to focus on biological and cultural pest control, while the remaining 20% hope to use chemical-based curative pest control.

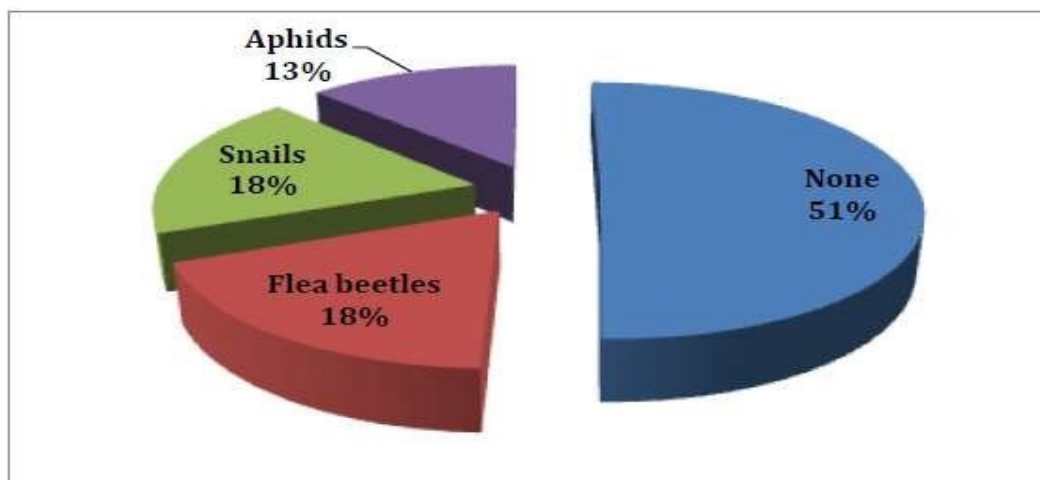


Figure 15: Main diseases and pests of rapeseed crops

This aspect of farming equipment is significant, given that the crop is entirely mechanised. Mechanisation is not just a question of ploughing and harvesting, but also of sowing, plant protection treatment and machine adjustment. Farmers had no prior knowledge of rapeseed cultivation and no affinity with the appropriate equipment and its adjustment. This is why mechanisation became a major constraint from the beginning of the project to introduce oilseed crops.

Seeding density is linked to soil preparation and the specialised seeder. In our survey sample (63%), farmers prepared their seedbeds to standard and 73% of them obtained homogeneous plots. On the other hand, 33% of farmers who worked their soil poorly produced heterogeneous plots. This technical failure, essentially linked to agricultural and soil tillage, will have consequences for cultivation and the adjustment of agricultural equipment (single-seed seed drill).

3.11. Socio-economic environment of the farm

3.11.1. Type of relationship with the market

Marketing systems are undergoing rapid change. Traditional marketing channels with one-off sales are being replaced by coordinated links between farmers, processors, retailers and others. As incomes rise, food consumption patterns change, with greater emphasis on meat, dairy products, fruit and vegetables. Consumers are becoming exigent when it comes to product quality and safety, also demographic and income-related trends are generating greater demand for readymade meals and guarantees of product safety. (Andrew W. Shepherd, 2009)

Farmers became involved in the oilseed crop project because the public authorities reassured them that the crop would be recycled by industrial units at national level. At the same time, our survey revealed that the majority of farmers are anxious and wondering about the fate of this season's harvest. We would point out that the CCLS has been slow to respond to farmers regarding the receipt of the harvest, following the delay in reaching agreements with the processors who are supposed to collect all of this year's harvest.

Link types can be classified in different ways. The following typology is used: - Farmer to national trader; - Farmer to retailer; - Links through a lead farmer; - Links through cooperatives; - Farmer to agribusiness; - Farmer to exporter; - Contract farming. (Andrew W. Shepherd, 2009)

All the farmers in our sample had no answer about logistics and no contract had been signed to sell their crops or the terms of payment.

This ambiguity has created a climate of uncertainty and doubt among farmers, who fear that the future of this crop is in danger of disappearing rapidly because of the almost total lack of coordination between the chain, which should have been established by the public authorities so that farmers could concentrate on production instead of worrying about the logistics and marketing of their harvest.

Moreover, all the producers have no relationship with the company responsible for collecting their rapeseed once it has been harvested, which suggests that the lack of coordination between the farmers and the first player in the commercial chain, in this case the company that should have bought the rapeseed, has still not been clarified.

In our case, the one and only company that could ensure the purchase of rapeseed is the private company Cevital, which should sign contracts with farmers to reassure them, and to encourage more farmers to get involved in this very promising project. The monopoly of this company, which usually imports its raw material to make oil, must turn to the production of national agriculture. This climate of confusion must be addressed by the wilaya agricultural departments and the supervisory and support bodies.

3.11.2. Effect of yield on production costs

Graph 16 shows that only 23% of farmers consider their crop to be profitable because of the yield recorded (over 20q/ha). This figure can cover production costs. At the same time, another 77% consider their crop to be unprofitable (less than 20q/ha). This means that the majority of farmers consider their investment in rapeseed cultivation to be unprofitable, which could pose a threat to the future of rapeseed cultivation in the wilaya.

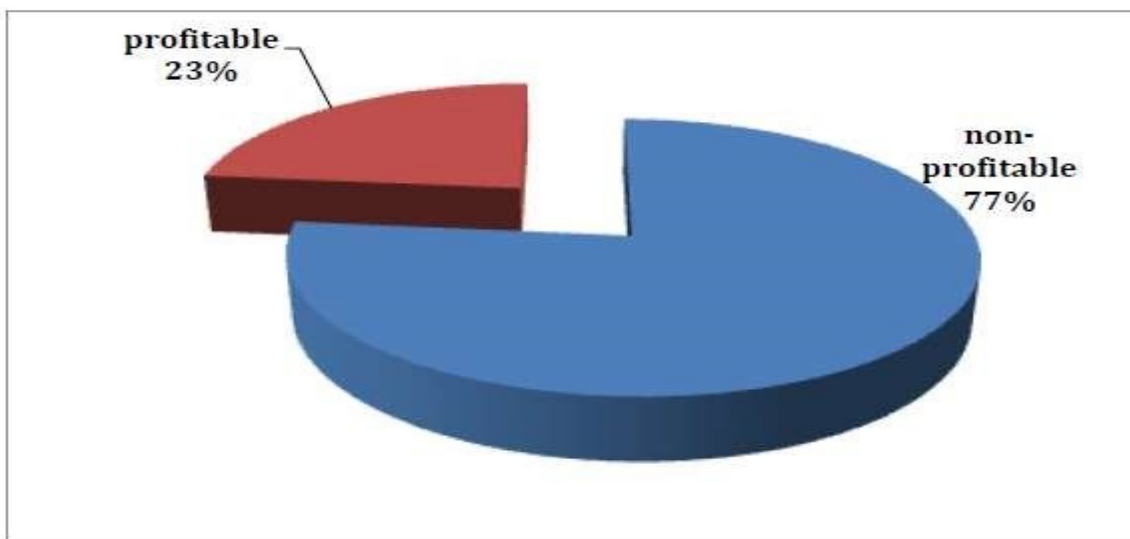


Figure 16 : Farm profitability

These impressions suggest that rapeseed farming is having trouble convincing farmers, since the most important indicator is the yield per hectare. Given that the break-even point is estimated at 20 qx/ha under current conditions of mechanisation, labour and inputs, a large majority are finding it difficult to achieve the desired levels of production and yield. As a result, production costs are high and expenses substantial, which would put farmers in doubt about future, and the future of the crop in the coming crop years, bearing in mind that these same farmers (77% of the total in our survey sample) should serve as examples for other investors in order to promote the project and make it more widespread among the farming community in the wilaya of Skikda. On the other hand, 23% of the farmers questioned felt that the project was profitable, with production and yield levels above 20 qx/ha. It turns out that they are among the farmers who have relied on self-financing and have the

appropriate agricultural equipment, enabling them to carry out the semi-financing and monitoring of cultivation operations on time.

3.12. Prospects for continuing to grow oilseed rape in the coming years

Figure 17 shows that only 40% of farmers are inclined to grow rapeseed again next year, compared with 60% who have decided to change crop for reasons essentially linked to profitability, marketing problems and the technical constraints mentioned above. As for investment, all the farmers in our survey sample do not plan to invest any more in this crop, other than to extend the area under cultivation in the coming years.

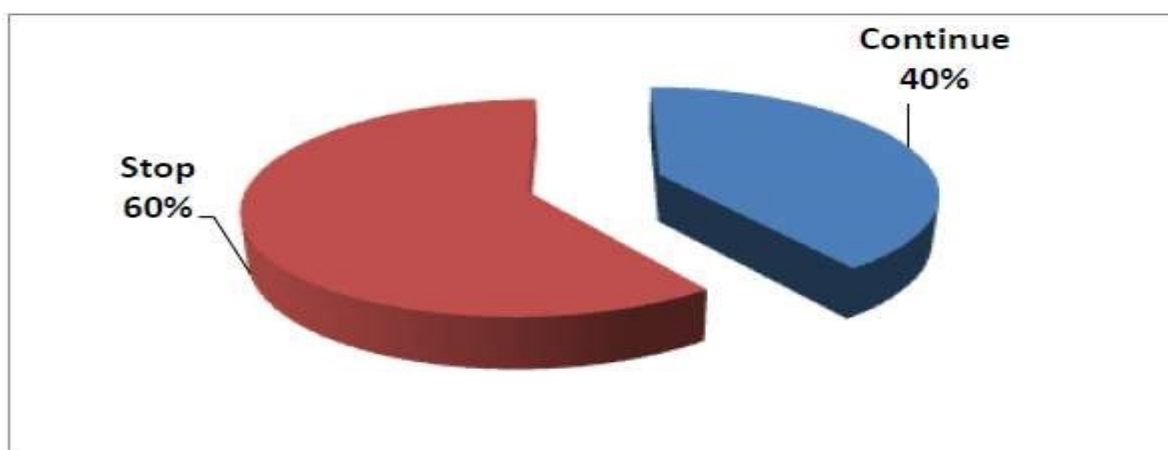


Figure 17 : Farmers' views on the future of rapeseed growing 4. Conclusion

This study, which has extended over two consecutive agricultural seasons (2021 and 2022), involves monitoring, field surveys and evaluations among farmers and various stakeholders and development organisations in the Wilaya of Skikda, in order to assess the current status of the project to introduce rapeseed cultivation in Algeria. Our study was not limited to preliminary work, however, it delved deeply in the approach to the field in order to analyse the project, the mechanisms for its implementation and the role of the various players. The methodology we adopted enabled us to highlight the various constraints facing rapeseed growing in the Wilaya of Skikda and the pace of its development among farmers.

Rapeseed is a highly profitable crop under ideal agronomic conditions and when the socioeconomic environment is ready to support farmers in the processing, logistics and marketing stages. Our surveys and analyses reveal a series of constraints and challenges that the authorities urgently need to address if this highly promising project is to succeed in the coming years.

As a result, our study reveals the following constraints:

- Farmers with little education, as only 67% of them have secondary or university education, while the rest have primary education. This is undoubtedly a major constraint on learning the farming techniques needed to grow crops, but it also makes it difficult for illiterate producers to perfect and

learn the advice on periodic updating that every farmer must have if the rapeseed project in the Wilaya of Skikda is to succeed.

- The land aspect is a real problem facing the majority of growers, as the farmland earmarked for rapeseed cultivation is mainly managed by investors whose main aim is to exploit the opportunities and advantages of this project. The number of tenants is therefore also huge. As a result, the involvement of farmers in the project could become a major issue and the whole project could be called into question in the coming years.
- Farmers with little experience of growing rapeseed and its techniques. This is a major constraint that could jeopardise the success of the project in general, as it could have a direct impact on production and yield levels, particularly when farmers are not supported by a reliable and effective agricultural extension and training system. As evidence of this, our surveys show that many of the interviewed farmers are growing rapeseed for the first time. This means that most farmers lack agronomic experience, crop management techniques, and protection and irrigation measures. In fact, this is an indicator that can become a major obstacle if agricultural guidance and support systems are not putting in place to support producers.
- Some farmers are reluctant to take out bank loans, subscribing to one of the formulas introduced by agricultural banks, namely "Rfig", which is a reliable method of financing recommended by the agricultural authorities. In this respect, 33% of our survey sample are self-financing in the context of this project, while 20% refuse to make this choice for strictly religious reasons linked to the interest they may incur by applying for a loan in the deep belief that the formula could generate interest, whereas in reality this bank loan is at zero rate (interest-free).
- Complexity in implementing the project, especially because of the involvement of several players in training and supervision, financing and processing, which leaves producers lost between administrations and offices without really understanding who is who. This confusion is a major constraint that reflects a climate of haste in the management of this project.
- Gaps and imperfections in the extension and training system:

The data we have retained on the extension and training and support apparatus provided by the Technical Services, the adopted approach presents some gaps and imperfections intrinsically linked to it, and the purpose sought, with regard to the fact that the subject was introduced without other complementary aspects. This could jeopardise the project as a whole, and moreover, it turned out that this training was imposed on farmers without first establishing a consultation platform aimed at increasing farmers' acceptance. As a result, the data from our survey shows that training is totally imposed in terms of time and space, also in terms of content, which leaves some people dissatisfied and wanting to know more about the culture and behaviours in order to better understanding the cultural contexts, and behavioural aspects of training. Do your job well. Our survey sample as a whole showed that it did not cover the disappointments associated with training and development courses.

- Constraints linked to equipment and the availability of appropriate material: our surveys revealed that the question of equipment is central to the success of the project to introduce rapeseed cultivation in the wilaya of Skikda, because the crop is new and its management is also distinct, which undoubtedly requires appropriate agricultural equipment and very particular technical skills.

As a result, 80% of the farmers questioned said that the lack of such equipment was a constraint on farming operations, particularly during sowing and harvesting. The period during which producers judge the need for this equipment is mainly during harvesting without waiting. Any delay can lead to huge losses in production and yield, but far less than those caused by semi-finished products. The reason why growers do not have suitable equipment for growing oilseeds, particularly rapeseed, is mainly due to the fact that the project is new and at an experimental stage, and that equipment is also scarce on the market. This is particularly true given that the crop has only recently been introduced throughout the country and is still in the experimental phase.

- Dysfunction at the level of the extension system put in place, which is essentially reflected in the mismatch between farmers' concerns and the advice provided and the training and courses scheduled to accompany the project. This anomaly has had a direct impact on the subjects dealt with in relation to rapeseed cultivation, since the agricultural extension system intended to support producers is mainly focused on three aspects linked to tillage, fertilisation and harvesting (25%, 25% and 16% respectively), without first putting in place a consultation platform designed to increase farmers' acceptability and ensure the support of the farming community.
- Farmers are under-equipped in terms of appropriate agricultural equipment, which is mainly reflected in the availability of technical equipment for sowing, crop management, phytosanitary treatment and harvesting. These results once again confirm the haste of the agricultural authorities in implementing this project.
- The unavailability of seed on time is one of the major constraints facing rapeseed growers at the start of the crop year. Indeed, the monopoly exercised by the CCLS, the only organisation authorised to supply farmers with seed, has made cultivation difficult and sowing is behind schedule for 40% of our survey sample.
- The ineffectiveness of phytosanitary treatments and the invasion of rapeseed fields by weeds is a constraint which adds to the anomalies already raised in the previous section. This implies that imported seeds could be contaminated by weeds, which jeopardises the continuity of this project in the years to come.
- Ambiguity regarding the purchase of the harvest by the processing organisations is an issue raised by our entire survey sample. In fact, this issue gave rise to a feeling of doubt among farmers, who feared that they would not find a buyer for their harvest at the end of the crop year, as confirmed by the absence of any contract between producers and processing companies.
- All these constraints are compounded by the fact that 77% of farmers feel that their crop year is unprofitable, given the yield levels achieved in relation to production costs (less than 20kg/ha).

Finally, it is important to stress that these constraints are the real reality of a project that was set up without planning and without a platform for consultation with local stakeholders. The absence of a rigorous plan to ensure the success of this crop. The future prospects of the growers interviewed could be serious insofar as 60% of them say they will not replant rapeseed next season, justifying this choice by the constraints they have had to face for two consecutive years. As a result, the success and continuity of rapeseed growing, which obviously adapts well to the climatic and edaphic conditions of the Wilaya of Skikda, is in a state of uncertainty that could jeopardise the project as a whole.

Ultimately, this study leads us to ask the following question:

Who is responsible for compensating farmers, most of whom are going through a difficult economic situation linked essentially to the profitability of their investment? Will the introduction of a sunflower crop, which consumes a lot of water, help farmers to sign up to this new project, when the oilseed rape project has still not proved successful?

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