



Ministry of Foreign Affairs

Tomato Processing Study Algeria

Value chain and stakeholder analysis for north-east Algeria

Commissioned by the Netherlands Enterprise Agency

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Executive summary

During the past decade the Algerian tomato processing value chain has developed to such a size and level that it has become an interesting subsector for cooperation between Dutch and Algerian partners. Internationally, the Dutch horticulture sector is front runner in the field of horticultural knowledge, research and the development of sustainable products and technologies. And although it is well positioned to contribute to the development of sustainable food production in Algeria, its presence in the country is rather limited. This study aimed to facilitate and stimulate more cooperation between the sectors in the tomato value chain by providing clear insights in the organisation and performance of the value chain, its key actors and the opportunities for cooperation. In addition the study delivered the ground works for follow-up programming for the development of future cooperation.

Algeria is the largest country on the African continent, but with the Sahara occupying 80% of the country, only 8,5 million ha is available for agricultural production. With a population estimated at close to 44 million in 2020 and that is increasing by an estimated 1 million a year, Algeria has a growing number of mouths to feed. It is Algeria's strategy to reduce its reliance on imports and strengthen its food security situation in the face of two major constraints: access to land and water resources. The NENA region to which Algeria belongs is among the most water-stressed regions in the world. At present 59% of the available water comes from ground water and 24% from surface water, of which around 65% goes to agricultural use. The groundwater resources are in heavy use but remain largely unregulated, leading to rapid depletion of aquifers and deterioration of water quality.

Algeria has a large horticulture sector that has grown with 24% to over half a million hectares of vegetable production over the period 2010-2019. The production of tomatoes represents 10% of the total vegetable production and around half is estimated to go to canned products. Processing tomato production in Algeria is exclusively for the national market (at present) and it is regarded as a strategic value chain by the Algerian government. After problems with excessive imports of triple concentrated tomato paste and local overproduction of tomato in 2018, the Algerian government decided to implement an action plan to regulate the problems. The plan involved supporting (the development of) processing units, a high import levy on the import of double and triple concentrated tomatoes, minimum price setting and the provision of subsidies to farmers and processors.

After that, the market for processing tomato began to organize itself. According to government statistics the surface areas planted by the industry's operators have risen from 16,000 ha in 2013 to 26,957 ha in 2021 (Assassi et al., 2024). This growth has allowed Algeria to ensure its self-sufficiency in terms of double- and triple-concentrated tomato paste and to drastically reduce tomato paste imports to almost zero in 2019/2020 and 2020/2021.

Around 77% of the industrial tomato production can be found in the north-east of the country, close to 20% in the west and the remaining in the south. The wilayas Annaba, Skikda, Guelma and El Tarf are the 4 historical growing areas of the north-east. Algerian research concluded that in this region yields in excess of 100 tonnes per hectare are achieved by farmers that use drip irrigation and hybrid seed varieties, however common yield levels are 60 tonnes or less per hectare. Processors have little control over the choice of tomato variety while several aspects such as thin skin, high Brix (>4.5), sweet taste, red colour and a low percentage of greens during harvest, are very important for the processing results. Farmers often plant dual purpose tomato varieties with suboptimal Brix numbers

that do not give optimal processing results but can be sold at the fresh market as well when prices are better there.

Approximately 30 to 40% of the tomatoes for processing is being harvested mechanically, the majority is harvested manually. After harvest, the tomatoes are being transported in bulk, in open trucks to the processors. There are no traceability systems in place and the farmers do not produce their tomatoes according to a certain standard or certification scheme.

The majority of all the hardware and inputs that is used in the sector is imported by importers. Nearly 95% of the hybrid vegetable seed is imported, main suppliers of industrial tomato variety seeds are Syngenta, Nunhems and Clause. Hardware that is imported for the tomato processing sector consists mostly of greenhouse technologies and seed planting lines for the nurseries, mechanization for the farmers and the equipment and installations of the high-tech processing plants.

An estimated 80 to 90% of the young plants produced for the tomato processing sector come from nurseries. The infrastructures used in the nursery vary from tunnels, Canarian greenhouses to multispan greenhouses depending on its functionality and the location. The nurseries are often a few hectares in size and are equipped with modern technology such as flexible and automated ventilation, screening systems, blowers and gas heating systems, automated fertigation, sprinklers and basic cooling systems.

Industrial tomato is cultivated in majority by small to medium-sized producers that cultivate areas between 5 and 10 hectares, with 63% having less than 5 hectares (Assassi et al., 2020). The very large farmers have production areas between 50 and 200 hectares and use mechanization for all processes including soil preparation, planting and harvesting.

In 2021, Algeria was home to 24 tomato processing factories or canneries (Assassi et al., 2024). Visited processors had 350 and 900 hectares with 50 to 200 farmers under contract and an installed processing capacity of 2500 tonnes per day. Products include the double concentrated tomato paste at different concentration levels (22% and 28-30%, premium selection), triple concentrated tomato, pizza sauce from lower quality tomato, canned green beans and peas, fruit juices and fruit jams, and harissa (canned hot pepper).

Producers operate as contract farmers to the processors. The level of support that processors offer to farmers varies. Several processors organize the supplies of inputs as part of the contract farming, a few pre-finance a small amount for the purchase of inputs as an insurance that the farmer will feel obliged to actually deliver their tomatoes to them. Many farmers complain about the prices and the very long payment periods. Farmers state they are obliged to supply their tomatoes within 2 days after harvesting and are not allowed to store them, while the waiting times for the trucks with harvested tomato at the factory in peak season is often a few days up to a week.

The majority of the tomato paste production takes place in the peak season from late June to August, during which the factories are operational 24 hours per day. The clients of the processing factories are mainly the wholesaler, who supplies the smaller shops and supermarkets with their products.

Important sector associations and (local) government bodies include the National Interbranch Council of the Tomato Industry (CNIFT), the Directorate of Agricultural Services (DSA) and the Agricultural Chamber that provide support and advise to farmers, liaise with the Ministry of Agriculture and Rural Development (MADR) and implement their policies.

Although the sector has shown substantial growth and development since the implementation of the new government policies in 2018, still many challenges remain. The overall observation is that the processing tomato value chain can use modernization and optimization throughout the entire chain to optimize the use of scarce water, reduce large post-harvest losses, and optimize processes and quality levels. Storage, logistics, planning and improving cooperation between chain partners also play an important role. Climate change and rising production costs contribute to the need to modernize the sector as well. A SWOT analysis gave the following headlines:

- Strengths: Reasonably well functioning sector with room to expand and government support
- Weaknesses: Outdated knowledge and technologies applied in combination with sub-optimal cooperation between farmers and processors on various topics
- Opportunities: Growing local market and opportunities for product diversification and possibly export in the future
- Threats: Climate change; drought requires drought resistant varieties and investment in irrigation

The Algerian nurseries provide business opportunities for Dutch horticulture suppliers in the field of input supplies, mid- to high-tech greenhouses and greenhouse technologies, and nursery specific equipment and materials. The opportunities that were identified with Algerian farmers (via importers/distributors) for open field industrial tomato production include input supplies, mechanisation (soil management) and irrigation systems. For both groups, the combination with transfer of required technical knowledge and skills is a necessity. The assumption is that the majority of the farmers is not open to paying for training, but willingness to pay was observed at nurseries and large scale farmers/investors.

Possibilities for doing business with the processors can be found in input and possibly hardware supplies, laboratory equipment and/or related services to raise the level of quality assessment and control in the value chain, also accompanied by capacity building on process coordination, factory and logistic process management and quality management.

The recommendations for further development of the sector include the following routes:

- Sector development through professionalized and expanded contract farming, including legally binding contracts for farmer-processor cooperation, acceptance of contract enforcement on both sides (supply and offtake obligations), more support to the farmers - and thereby control for the processors- by providing guidelines and support during production, including an increase in assessment and control of the quality level of the sourced produce, processed products and processes
- Sector development by improving financial arrangements, whereby access to finance or credit for farmers, payment of importers/distributors and payment terms and conditions are improved
- Sector development through implementation of Dutch technologies, which includes the aspects of tomato variety breeding, technologies for greenhouse climate, fertigation and water management, climate smart irrigation technologies for open field production, mechanization, and quality assessment and control

1 Introduction

1.1 Background

Algeria is the largest country on the African continent, but with the Sahara occupying 80% of the country, only 8,5 million ha is available for agricultural production. Despite the ongoing efforts made by the government to develop uncultivated land, arable land remains limited and its per capita availability continues to decrease to 0,2 ha per capita at present.

With a population estimated at close to 44 million in 2020 and that is increasing by an estimated 1 million a year, Algeria has a growing number of mouths to feed. It is Algeria's strategy to reduce its reliance on imports but the country continues to rely heavily on import of agricultural commodities and food annually. In search of strengthening its food security the country has adopted policies to rehabilitate the agricultural sector in the face of two major constraints: access to land and water resources.

The NENA region to which Algeria belongs is among the most water-stressed regions in the world and according to the thresholds of water scarcity proposed by Falkenmark in 1989, Algeria is classified among the countries where water scarcity is absolute. At present 59% of the available water comes from ground water and 24% from surface water, of which around 65% goes to agricultural and 32% to domestic use. The groundwater resources are in heavy use in Algeria and the region but remain largely unregulated, leading to rapid depletion of aquifers and deterioration of water quality (Hoogerwerf, 2023).

Algeria has a large horticulture sector that has grown with 24% to over half a million hectares of vegetable production over the period 2010-2019. More than 21,000 ha exists of greenhouse production. Tomato is an important crop in the diet of Algerians, produced in a region with a high impact of climate change in terms of water availability. The production of tomatoes represents 10% of total vegetable production, around half is estimated to go to fresh table-tomato consumption and the other half to canned products.

The processing tomato value chain, which plays a critical role in employment generation and the production of a highly demanded product (tomato paste), is regarded as a strategic value chain by the Algerian government (Assassi et al., 2024). In order to promote investment in the tomato value chain, the government has implemented a marketing contract in 2009 to facilitate coordination between farmers and companies (Assassi et al., 2020).

Around 2018, production of tomato came close to reaching the saturation level of the local market while export was (and is) not taking place (at a significant level) and tomato processors were struggling with excessive imports of triple concentrated tomato paste from foreign countries such as China and the US. Surpluses appeared to be increasingly difficult to manage by the government which resulted in a demand from industry professionals for restrictions to the import. The Algerian government decided to implement an action plan to regulate the problems. The plan involved supporting (the development of) processing units, a high import levy on the import of double and triple concentrated tomatoes and the provision of subsidies – or so-called premiums- to the actors active in the tomato processing value chain.

After the change in policy, the market for processing tomato began to organize itself and nowadays forms a value chain that is functioning reasonably well but many challenges still exist.

The government is pursuing development and modernization of the agri-sector as a response to the increasing food demand, but also because it is considered a means of diversifying the economy and attracting foreign and domestic investment outside the energy sector. Following the hydrocarbon crisis that hit Algeria in 2014, more local investors have become interested in the horticulture sector. These new investors are result oriented, receptive to modernization of production techniques and have a good financial base

Nowadays the tomato processing sector and its stakeholders have developed to such a size and level that it has become an interesting horticulture subsector for cooperation between Dutch and Algerian partners. The sector needs modernisation throughout the value chain to optimize the use of precious resources such as water, reduce produce losses and optimise earnings. The scope for cooperation could potentially include the full value chain from the seedling production in greenhouses at the nurseries and the open field production of the tomatoes to the activities of the processors in post-harvest management and logistics, processing and distribution.

The Dutch horticulture sector is front runner in the field of horticultural knowledge, research and the development of sustainable technologies that can be customized to specific cultivation conditions on the ground. The Netherlands is a globally respected supplier of integrated growing systems and thereby ideally positioned to contribute to the development of sustainable food production in Algeria. At this moment in time the Dutch horticulture sector's presence in Algerian is rather limited. This study is aimed at facilitating and stimulating more cooperation between the sectors by providing clear insights in the tomato processing value chain, its key actors and the opportunities for cooperation. In addition the study will deliver the ground works for follow-up programming in the form of a draft action plan, including consortium composition and draft budget, planning and timelines for the development of future cooperation.

1.2 Objective

The objective of the study was to gain a detailed understanding of the tomato processing value chain in Algeria, including the important (private sector) parties in the Algerian tomato processing value chain and to identify parties who have capacity and interest to develop this value chain in Algeria.

The project should lead to the development of a draft proposal for follow up programming on the tomato processing value chain in Algeria.

1.3 Methodology

In order to describe the tomato processing value chain and the opportunities for cooperation with the Netherlands, a desk study was carried out followed by a visit programme and additional interviews and data collection. The visit programme was supported by the agriculture office of the Netherlands Embassy in Algiers and was carried out in December 2023. Based on the collected information, a stakeholder mapping and analysis of the sector was carried out. The focus area of the study included the north-eastern region of Algeria, being Annaba, Guelma, Skikda and El Taref.

1.4 Reading guide

In chapter 2 of this report, a general introduction to Algeria and its agriculture sector is given. The processing tomato value chain is described in detail in chapter 3, including information on the market, the production areas and productivity levels, and the processing.

In chapter 4 all sector stakeholders varying from private sector to government and knowledge institutes are described, followed an overview of the business opportunities for the Dutch private sector in chapter 5.

A roadmap for the tomato processing value chain is presented in chapter 6, including an analysis of the strengths, weaknesses, opportunities and threats, and recommendations for sector development in relation to what the Netherlands has to offer to Algeria. In chapter 7 the overall conclusions and recommendations are summarized.

2 Algeria country and agriculture sector information

2.1 Country introduction

Algeria is a country in North Africa, part of the Maghreb, with an area of more than 2 million km², which provides it with a lot of natural wealth, including gas, oil and other valuable resources. The Sahara occupies 80% of the country's area. The remaining 20% of the area is located in the north of the country and is crossed by two mountain ranges which are the Tellian Atlas and the Saharan Atlas. The Algerian population has exceeded 44 million inhabitants with a median age of 28.4. The National Office of Statistics estimates that the population will reach 51 million by 2030 and more than 70 million by 2050.

Algeria is the 17th oil producer, the 10th producer of natural gas and the 7th exporter of natural gas in the world (2021). Algeria's oil reserves rank 15th in the world and that of natural gas 13th in the world. Algeria's natural reserves are still largely underexplored and there are big opportunities to find new deposits.

The Algerian economy is highly dependent on petroleum and natural gas exports. The economy has grown strongly in recent years, mainly due to the rise in oil and gas prices in recent decades, and strong demand on world markets. Algeria main exports partners are United States, Italy, Spain, France and Canada. Economic growth has been good, up to +6% per year. But Algeria remains very dependent on oil revenues, which account for more than 85% of its exports.

Over the last two decades, Algeria has embarked on the development of its infrastructure: roads, dams, electricity and seawater desalination stations. Parallel to that, an economic recovery plan has been put in place, particularly for the agricultural sector, which currently contributes to 14% of the GDP and employs 2.7 million people (Hoogerwerf, 2023).

2.2 Algeria's agricultural sector

Agriculture is of capital interest in Algeria. Despite the ongoing efforts of the government to expand the area of arable land through the development of uncultivated land - mainly in the steppe and Saharan areas - arable land remains limited. The total Algerian agricultural area is estimated at nearly 44 million hectares which represents only 18% of the Algerian territory. Most of this land (75%) is rangeland, leaving less than 9 million ha to arable land. About 33% of arable land is fallow annually and 12% is intended for permanent crops. The horticulture sector, including vegetables and potato, occupies 5%.

The area under vegetable crops has shown a significant upward trend over the period 2010-2019. It increased with 24% from 429,417 ha in 2010 to 533,060 ha in 2019. Growth slowed down during 2020 as a result of the devaluation of the Algerian dinar, which drove up the prices of agricultural inputs (Daoudi, 2021). According to the provisional data provided by the MADR (data not yet published), the area of horticulture production fell by nearly 3% in 2021 compared to 2020 (533,173 ha in 2020 and 517,424 in 2021). This decrease in the areas of open-field vegetable crops may be the consequence of the drought. As part of the implementation of the 2020-2024 sector roadmap, the Ministry of Agriculture and Rural Development has launched a "National Census of Agricultural and Livestock Farms" operation. This census began on May 19 and will continue until July 17 2024, the updated sector results will be published from September 2024 onwards.

In agriculture ground water is the main water resource for irrigation, besides water from dams. Treated wastewater is very rarely used. The irrigated area, which was 985,220 ha in 2011, increased to 1,5 million ha in 2021. Algeria aims to reach 2 million hectares of irrigated area in the near future.

The areas and production levels of the most important vegetable crops are listed in Table 1. Potato cultivation accounts for the largest share in terms of area (30%) and production (34%). It is a strategic cultivation in Algeria because it is the first product on the shopping list for household consumption. Melon and watermelons (12%), onions (9%), peas (7%), beans (6%) and tomatoes (5%) are also important products in terms of area size. These crops are produced in the open field with the exception of tomatoes, watermelons and melons which are grown in the open field or in greenhouses depending on the region.

Tomato is the second vegetable product after potato, because of the place it occupies in the eating habits of Algerians. Although the area allocated to tomato represents only 5% of the total horticulture area, the production of tomatoes represents 10% of total vegetable production (Hoogerwerf, 2023). Tomato for processing purposes is grown in the open field.

Table 1 Vegetable production according to species

	Area (ha)	%	Production (tons)	%
Potatoes	157864	30	5020249,9	34
Melon and watermelon	62652	12	2206866,6	15
Onions	50292	9	1 613 729,8	11
Green peas	38959	7	200 025,8	1
Green beans	33078	6	298 483,7	2
Tomatoes	24994	5	1 477 878,6	10
Carrots	17469	3	419 534,4	3
Zucchini	14372	3	420 135,4	3
Garlic	13403	3	223 311,3	2
Green beans	12706	2	95 022,6	1
Pepper	11381	2	366 885,7	3
Chili pepper	10348	2	308 282,3	2
Cauliflowers	8629	2	205 439,5	1
Turnips	8328	2	149 906,7	1
Eggplant	6027	1	184 145,7	1
Artichoke	5792	1	119 636,3	1
Green cabbage	4317	1	116 426,5	1
Cucumber	4078	1	166 045,6	1
Others	48373	9	1 078 035,3	7
Total	533061	100	14 670 041,3	100

Source: calculated from series B data; MADR

2.3 Natural resources and climate

The NENA region to which Algeria belongs is among the most water-stressed regions in the world, with 6% of the global population but only 0.6% of the world's accessible renewable water. According to the thresholds of water scarcity proposed by Falkenmark in 1989, Algeria is classified among the countries where water scarcity is absolute.

According to a study commissioned by the Agricultural Offices of the Dutch Embassies in Algiers and Rabat in 2021, the groundwater is being exploited over recharge level (Langenberg, 2021). The groundwater resources are in heavy use in the whole region but remain largely unregulated, leading to rapid depletion of aquifers and deterioration of water quality.

According to a recent FAO report there is evidence of consistent warming trends across the region since the middle of the 20th century, with a significant increase in the frequency of warm days and higher temperature values. Precipitation analyses show greater variability and less significant trends than for temperature, but sub-regional and country studies point to downward trends overall (Crumpler, 2022). Current projections for climate change suggest an increase in the frequency, intensity and duration of droughts accompanied by a decrease in precipitation (Hoogerwerf, 2023). According to the World Meteorological Association the knowledge of the El Niño impact on North Africa is much less established. Many studies have been carried out, with no clear results. In the event of a pronounced El Niño phenomenon, however, it seems likely to lead to a reduction in rainfall in spring, which is the critical period for the growth of several crops (https://www.lemonde.fr/en/lemonde-africa/article/2023/07/20/north-africa-is-used-to-the-heat-waves-europe-is-now-experiencing_6060399_124.html).

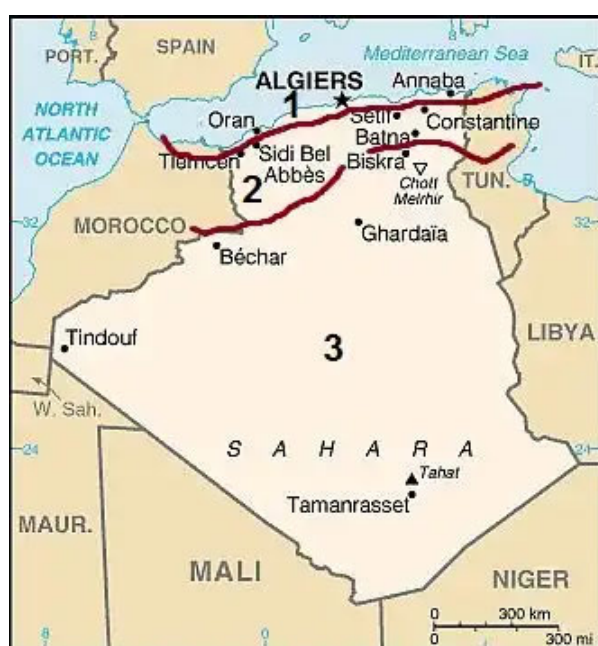


Figure 1 Climate zones in Algeria

Figure 1 shows the 2 main climatic zones in Algeria, the first being the Tell region with a Mediterranean climate, the second the semg-arid region of the Highlands or Steppe and the third is the arid Sahara. Table 2 gives more information regarding the seasonal conditions and rainfall in the three zones (Hoogerwerf, 2023).

In the Tell region, near Annaba, where the majority of the processing tomato acreage can be found, the annual rainfall seems rather adequate for production. Local officials state that they have even received 1200 mm of annual rainfall in the region close to the Tunisian border. According to all sector parties the availability of water however is forming an important problem for the sector.

Table 2: Climate zone specification

Zone	Climate	Seasonal conditions	Annual rainfall
1) Tell	Mediterranean	hot and dry summers, mild and rainy winters	400 - 1.000 mm
2) Highlands/steppe	Semi-arid	hot summers, cold winters	200 - 400 mm
3) Sahara	Arid	extreme temperatures in winter and summer	<130 mm

After a few drier years, the sector suffered from severe droughts during the 2022-2023 campaign, which heavily impacted the production results of that season. Sector stakeholders mention losses for approximately 60% of Algerian farmers. The drought during the 2022-2023 campaign was an extreme catastrophe nationwide whereby the government now has stated to support the agriculture sector with an extra fund. In autumn to winter 2023, the region was however struggling with inundation after very heavy rainfall.

2.4 Imports

Algeria imports mainly capital goods, foodstuffs and consumer goods. Its main import partners are: France, China, Italy, Spain and Germany. Over the last two decades the import bill of Algeria represented 40 billion dollars on average annually. The development of imports follows an upward pattern since 2000 with a peak recorded in 2014 at an estimated bill of 64 billion dollars. From this year imports declined again following the fall in the price of oil and the measures of the government to rebalance the trade balance. The yearly trade balance deficits have grown to around 10.60 billion USD for 2020 and 17.7 billion USD for 2022. For 2023 however this pattern seems to be halted, Algeria is reported to have recorded a trade surplus of 3790 USD million in the third quarter of 2023 (<https://tradingeconomics.com/algeria/balance-of-trade>). The government has managed to reduce the country's imports over the last three years in order to have a positive trade balance.

For the period 2016-2020 the average food imports bill amounted to USD 8.5 billion and represented 26.34% (2020) of the total imports. The key imported food products include cereals, milk and dairy, sugar and sweets. No fresh vegetables are imported (Hoogerwerf, 2023). The import of processed tomato in the form of tomato paste has seen a strong decline in the most recent years as a result of government policies measures.

3 The processing tomato sector

3.1 Processing tomato market development

The processing tomato value chain plays a critical role in employment generation in Algeria and the produced tomato paste is a highly demanded product. Processing tomato production in Algeria is exclusively for the national market at present and it is regarded as a strategic value chain by the Algerian government (Assassi et al., 2024).

In the early 1990s, the tomato value chain was severely destabilized by agricultural trade liberalization and the fragmentation of large public farms and canneries into smaller private structures. This followed the liberal reforms the country experienced in that period. The resulting breakdown in coordination between farmers and canneries adversely impacted the value chain's performance, leading to significant crop abandonment, the substantial importation of raw materials, and the closure of several canneries (Assassi, 2017). In order to promote investment in the tomato value chain, the government implemented a marketing contract in 2009 to facilitate coordination between farmers and companies (Assassi et al., 2020). Gradually the processing of tomato starting growing again. Figure 2 shows the processed quantities of tomato over the past thirty years based on government statistics.

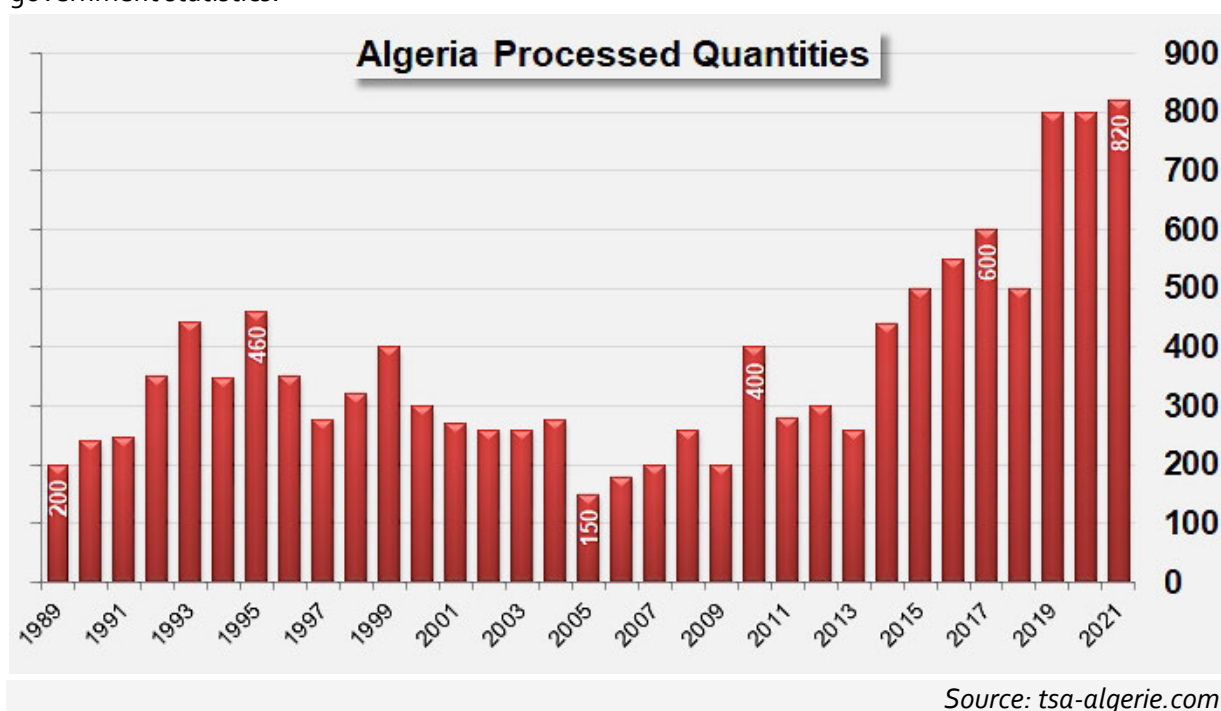


Figure 2 Quantities of tomato (tonnes) processed by the Algerian sector

Around 2018, production of tomato for table consumption and processing came close to reaching the saturation level of the local market while export was not taking place (at a significant level). At that time, tomato processors were struggling with excessive imports of triple concentrated tomato paste from foreign countries such as China and the US. The periodic surpluses of processing tomato appeared to be increasingly difficult to manage by the government which resulted in a demand from industry professionals for a ban on the import.

The Algerian government decided to implement an action plan to regulate the problem of overproduction. The plan involved supporting (the development of) processing units, a high import

levy on the import of double and triple concentrated tomatoes and the provision of subsidies – or so-called premiums- to the actors active in this value chain. The government also controls the minimum price setting for the industrial tomato, not for the fresh market.

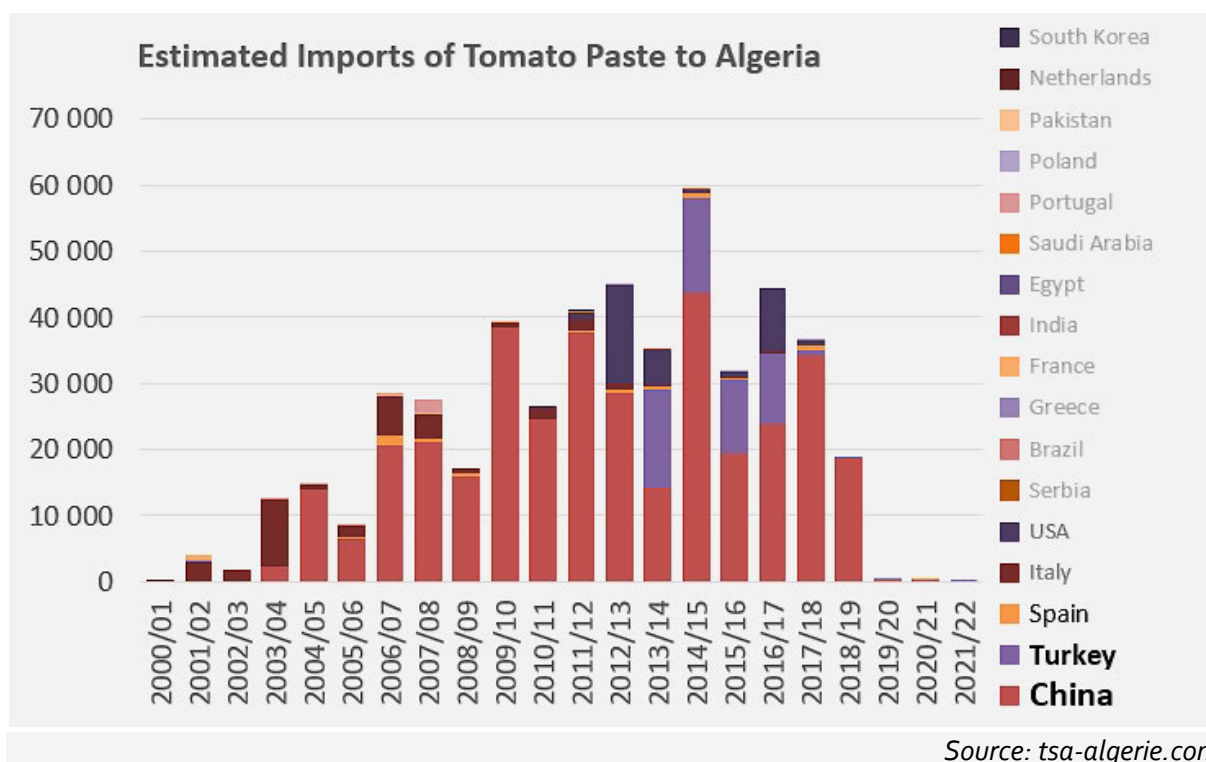


Figure 3 Estimated Imports of Tomato Paste

After the change in government policy, the market for processing tomato began to organize itself and its performance and size improved. According to government officials production of double-concentrated tomato paste increased from 20,000 tonnes in 2018 to more than 80,000 tonnes in 2021, and production of triple-concentrated tomato paste and from 9,000 tonnes in 2013 to more than 70,000 tonnes in 2021 (tsa-algerie.com).

Figure 3 displays the development in estimated volumes of imported tomato paste and its sources. The strong decline after the 2018/2019 year is the result from the government policies aimed to support the local tomato processing. Imports of triple concentrate have also reduced, according to sector stakeholders processors are only allowed to import it if there is no local supply available.

In the years 2022 and 2023 the supply of tomatoes to the processors has not been stable. In the 2022 season a decline in production was recorded, estimated at around 500,000 tonnes, caused by a reduction in planted surfaces. Part of the reason for the reduction of planted surfaces was the increasing price for horticulture inputs such as chemicals (fertilizers and crop protection), seeds and transport. According to the distributors, the prices of agricultural inputs have greatly increased over the past few years, up to 200% for some products. The sales prices of the processing tomatoes did not rise sufficiently to compensate for this increase in costs. This impacted the development of the sector. In fall 2022 government therefore decided to help farmers with the cost of fertilizer by covering 50% of its price.

According to CNIFT the main reason for the declining production acreage of tomato for processing however was the chronic delay in payment of products delivered by farmers to processing plants.

For tomatoes delivered to processing plants in July, the acceptable payment period is normally two to three months, i.e. September or October. Many of the processors waited with payment until they have received the government subsidy and longer. Gradually delays in payment became as long as nine months, or even a year. The reason for this was the poor financial situation of a number of large processors that have to pay back their credit with the Bank of Agriculture and Rural Development (BADR).

In early 2023 the National Interbranch Council of the Tomato Industry (CNIFT) expressed their worries over the development of the sector. The Algerian processing tomato industry has been facing several difficulties in the past year which according to CNIFT has been leading to an increasing disengagement on the part of the producers.

The year 2023 was a difficult year for the sector as well due to severe drought in spring. Some state the decision of the government not to use dam water for tomato production in some of the important regions has contributed to the poor results of the sector. The drought during the 2022-2023 campaign however was an extreme catastrophe nationwide. The government therefore stated to support the agriculture sector with an extra fund. This fund should fully finance the purchase of a basic irrigation system (goutte-à-goutte) by farmers. This initiative is extra to the already existing 80% subsidy for the purchase of this type of irrigation on a 5-yearly basis.

In the course of 2023 government arranged that premiums are no longer paid by the processing plants but by the National Interbranch Office for Vegetables and Meat (ONILEV) to improve the financial situation of farmers. They also stated computerized systems are under way to facilitate the processes. According to the sector stakeholders, premium payments for the 2023 production season have still taken a very long time.

Some of the processors may also still be having financial difficulties. The capacity of operators to obtain financing has been among the concerns of the industry for a few years, as they are having trouble moving their stocks and therefore generating the available funds that they need in order to pay growers and fulfil their repayment obligations to the BADR Bank for Agriculture and Rural Development.

All in all, the specific developments of the most recent years are making the current feedback from the sector not entirely representative for establishing a general trend for the future. For some of the processors that shared their productivity level the contracted hectareage has shown a significant decline in 2022 and 2023, while others have remained at the same level. For 2024 the expectation is that the planted acreage of tomato may have decreased somewhat as part of the farmers switched to crops that are less water demanding than tomato, have less risk for diseases, have lower or less fluctuating production costs and/or better payment terms. On the other hand, sales prices for the industrial tomato have risen significantly in 2023, making the production more attractive for farmers, and spring 2024 has seen enough rains for good production results. Based on the figures the processors are providing there is sufficient room in the market to grow. Also other sector stakeholders confirm there is a huge market for the processors, in processing tomato into their main product tomato paste but also in a variety of other products.

3.2 Market structure

In principal the market structure in the industrial tomato sector is shaped according to a vertical relation between processors and producers. A contract is signed at the beginning of the season (February) between the farmer and processor. It includes the mutual obligations, the acreage with estimated production tonnage, price, means of financing by the farming and the rights for the

processor to inspect the fields throughout the season. The producers and processors are financially stimulated by the government with subsidies, which roughly determine 30% of the price. The minimum price is fixed by the government, in contrary to the price for tomatoes that are sold for fresh consumption. In 2017 the minimum price for industrial tomatoes was set at 12 DZD/kg (0,09 EUR/kg) including 4 DZD/kg subsidy for the producers and 1,5 DZD/kg subsidy for the processors. Prices paid by the processors have almost doubled since then.

The contract is being used for the administration of the government subsidy and many people in the sector state that is its most important purpose. In practice there are significant levels of contractual default, especially through side selling by farmers. Another aspect that has led to contractual default that has been observed is that expected yields that are included in the contract have been over-estimated. This is often the result of difficulties that farmers encounter throughout the growing season in combination with technical constraints (Benmehaia, 2018).

In practice the market structure is said to also include middle men that buy from individual farmers and then sell to the processors. According to some sector stakeholders the intermediary role of the middle men has come up because farmers have had to wait very long at the processor's gate with their tomatoes that they decide to sell their tomatoes to the middle at a lower price. It is said that farmers sometimes already sells his tomatoes at the farm when they know the waiting is going to take very long. More information about this can be found in the next chapter.

For the interviewed processors the percentage of acquisition done via middlemen was below 5% according to their figures.

3.3 Processing tomato production

Cultivation of tomato for the processing industry is spread over several districts (wilayas). Around 77% of the production can be found in the north-east of the country, close to 20% in the west and the remaining in the south. Figure 5 shows the locations of the main districts of processing tomato production in the north-east. The wilayas Annaba, Skikda, Guelma and El Tarf are the 4 historical growing areas of the north-east and can be found on the map as the 4 most northern dots. Other production regions include Tipaza, Mostaganem and Ain Temouchent in the north-west, but here the acreage seems to be declining because of problems with diseases. In the south the main wilayas are Adrar, El Menia and Ain Salah, which are displayed in Figure 4.



Figure 4 and 5 Main districts of processing tomato production in the west and south, and north-east.

According to government statistics the surface areas planted by the industry's operators have risen from 16,000 ha in 2013 to 26,957 ha in 2021 (Assassi et al., 2024). This growth has allowed Algeria to ensure its self-sufficiency in terms of double- and triple-concentrated tomato paste thereby allowing

a drastic reduction in its foreign purchases, to the point of almost completely cancelling paste imports in 2019/2020 and 2020/2021. There were 3,531 tomato growers under contract in 2021, who planted 26,957 hectares, and almost 99% of this acreage was cultivated under the marketing contracts of the Algerian government (Assassi et al., 2024),.

The current strategy is to develop new cultivation zones in several northern wilayas, being Souk Ahras, Oum el Bouaghi, Khenchela and Tébessa. Combining these with the already existing cultivation zones, the aim is to close the loop in time and space in order to ensure production continues from January to December.

The tomatoes for processing are produced in the open field, important rotation crops are green beans, peas and onion. The production period of tomatoes is strongly tied to the climatic conditions of the different seasons. The traditional planning for the spring season production from the Annaba region (north-east) is:

- Sowing in mid-February to mid-March
- Transplanting from mid-March to mid-April
- Harvesting from the second half of June if it has been hot throughout the month of July

The transplanting window is depending on the temperatures and with the current varieties the production in the open field cannot start before March. Alternatively production would have to move into a greenhouse and this investment cost is currently not being made. According to the breeders the transplanting window can be moved up with a month till Mid-April to Mid-May but then you need to work with tomato varieties that are capable of flower setting under more hot conditions.

For the late season production from Tipaza, Mostaganem and Ain Temouchent (north-west) harvesting takes place in August running into September. In the south of Algeria, planting starts from late summer and harvesting is mostly done in December and January.

The results in this region are not the same as in the north in terms of yield and quality level of the tomato. Ideally the tomato plants produce 3 to 4 kilos of tomato per plant and 25,000 to 30,000 plants are planted per hectare. This means a yield range between 75 to 120 tonnes per hectare. This is feasible in the north, but should be considered the yield under optimal conditions. More commonly, a yield level of 60 tonnes or less per hectare can be expected.

A survey was carried out among farmers by Algerian researchers in 2018 that led to the conclusion that farmers who use drip irrigation and hybrid seed varieties achieve yields in excess of 100 tonnes per hectare, while those who use spraying for irrigating their yields do not exceed 65 tonnes per hectare (Bouزيد, 2018). Research on contract farming that was done in 2018 showed that expected yields were often included in contracts between processors and producers at values of 60 tonnes per hectare, up to 75 tonnes or 100 tonnes per hectare. The real yield in tomato production in that research had an average of about 40 tonnes per hectare (Benmehaia, 2018).

In the south of Algeria, yields of approximately 35 tonnes per hectare are the yield levels under optimal conditions. Also the quality level is lower as more kilogrammes of tomato are needed to make the same amount of tomato paste. According to local sources, the production of 1 kilogramme of tomato paste requires an estimated 5 to 6 kilogrammes of fresh tomatoes from the north, but 8 kilogrammes of fresh tomatoes from the south on average.

Harvesting of processing tomatoes is being done in one single harvest. At present the majority of the harvesting is done manually, approximately 30 to 40% of the tomatoes for processing is being harvested mechanically. After harvest, the tomatoes are being transported in bulk to the processors. There are no traceability systems in place and the farmers do not produce their tomatoes according

to a certain standard or certification scheme. This means there is no insight in the quality level of the tomatoes that are supplied to the processors in terms of chemical residues and other parameters.

3.4 Tomato processing

In 2021, Algeria was home to 24 tomato processing factories or canneries, all adopting the State's marketing contract. Many of the canneries are relatively small, with an average receiving capacity of 1,900 tonnes of tomatoes per day, and have a limited range of products, usually no more than three (Assissi et al., 2024). For the processors that shared productivity data the contracted hectareage varied between 350 and 900 hectares with 50 to 200 farmers under contract and an installed processing capacity of 2500 tonnes per day. For these processors, the period of the year that they are operating at full capacity is 1 to 1,5 months only.

Production of triple concentrated tomato is done by the larger processing factories and can be done 12 months per year. The triple concentrate can be stored long periods and later on diluted to produce double concentrate tomato paste. The double concentrated tomato paste is sold in cans at different concentration levels, varying between 22% and 28-30% (premium selection). The majority of the production takes place in a short period from the second half to end of June, depending on how warm it has been during the growing season, to August. During peak season the factories are operational 24 hours per day.

Some factories also process tomato for pizza sauce, for which they often use lower quality tomato. Besides that, some factories can green beans and peas and produce fruit juices and fruit jams from apricot and orange, and harissa (canned hot pepper).



Photos 1 and 2 Storage of triple concentrate, either in packhouses or in full sun

The majority of the processing tomatoes are processed in the north-east, the south has very little processing plants. According to the President of the National Interbranch Council of the Tomato Industry (CNIFT) there are 8 to 10 transformation complexes in the region between Annaba and El Tarf that are active in the processing of tomato, pepper and fruits. In both Skikda and Guelma 4 plants can be found making the total of operational plants in the upper north-east 16 to 18.

To get the best final product the raw material should reach its destination in the shortest time, thereby reducing the stress it has undergone during the (mechanical) harvesting and its transport to the factory. Unfortunately this is not the case during peak harvesting times in Algeria. After harvesting, the tomatoes are transported in open trucks to the factory. In peak season the truck cannot directly enter the processing factory and has to wait outside in mid-summer temperatures, sometimes for 2 to 3 days according to farmers. Some processors have created a large waiting area where trucks can

wait in line after a visual check of the load. It is also often seen that trucks have to wait in line along the road side.

During peak supply periods the processors are operational 24 hours per day and depending on their capacity can handle a certain amount of trucks within that time frame. One processor mentioned a handling capacity of 145 trucks per 8 hours, with 3 shifts per 24 hours that results in 435 trucks per 24 hours.

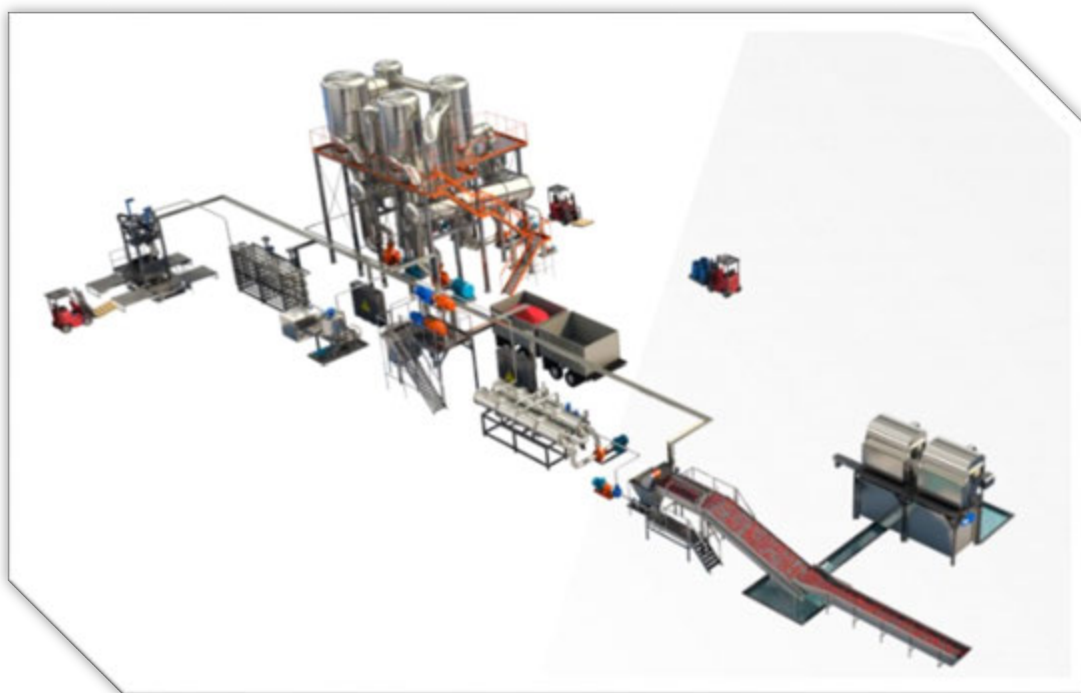


Figure 6 Tomato processing line (source: <https://www.fbr-elpo.it/en/tomato-processing/>)

The main processing steps in the production of a tomato paste include washing, sorting, trimming, breaking, juice extraction, concentration, pasteurization, filling and cooking. Figure 6 gives a schematic overview of a tomato processing line. When a truck can enter the process, the first step is weighing of the truck, after which the tomatoes are unloaded, washed and sorted, see photos 3 to 5. The washing is done by water that is being re-used for approximately 80% in the various steps of the process. In the final steps drinking water quality is being used.

The tomato is inspected visually for possible rejections. There are penalties for certain failures of the supplied tomato, such as a 10% penalty for misshaped tomatoes or a 5% penalty for green tomatoes. In practice processors see that 30% penalty is the maximum that is accepted by farmers, because they will take their produce to another factory if the penalty is higher. According to processors, there is on average 2-5% of waste found in the supplied tomato.

Every processor has its own approach relating to their specific target market. To give an example, a processor focussing on premium selection tomato paste and the production of triple concentrate, will be able to use approximately 20% of the extruded tomato for premium selection tomato paste and the remaining 80% will be taken out of the processing stream to another production line for triple concentrate purposes.

Samples are taken every hour and these need to be stored until the end of the production round. A random check of the samples is done to follow the quality of the products. The factory has a system

for automated traceability and can follow the batch through the system. The supplied tomato can however not be traced back to the farmer.

Rest streams of the tomato processing can be used as animal feed and are being donated or sold, one processor mentioned an income out of rest streams of 2 DZD (0,01 EUR) per kilo.



Photos 3, 4 and 5 Tomato for pizza sauce arriving at processing factory, December 2023

3.4 Processing tomato characteristics

Characteristics sought in varieties of tomatoes intended for processing in general include productivity, uniformity of size, disease resistance, organoleptic characteristics, and suitability for industrial use. Algerian farmers focus on drought resistance, yield quantity, firmness (transport, shelf life), and a concentrated harvest period. For the processors important factors are thin skin, high Brix (>4.5), sweet taste, red colour and a low percentage of greens during harvest.

High productivity levels can be obtained by using hybrid seeds. The local distributors of international seed breeders have demo fields in Algeria where they run trials with promising and commercial varieties. Important characteristics that are being recorded are tomato weight, the number of fruits per plant and the Brix number. They increasingly look at drought resistance also assess resistance against Tomato yellow leaf curl virus (TYLCV). This virus causes the most destructive disease of tomato and is the main issue for late transplanting of tomato seedlings.

The Brix number is an important factor that determines the quality level of tomato for processing. It reflects the Total Soluble Solid (TSS) content in the tomato or tomato product, the TSS in tomatoes mainly exists of sugars (fructose). Tomatoes for processing require a minimum Brix of 4.5. This compares with an acceptable range of 3.5 - 5.5 in common or round fresh tomatoes.

Factors that impact the Brix level of tomatoes are in the first place the choice of tomato variety and secondly the fertilization of the crop has an effect. Nutrients such as nitrogen, phosphorus, potassium and sulphur can have an impact on the levels of total soluble solids within the tomato. As well as improving processed tomato product quality, this has benefits in terms of improved taste and storage of fresh tomatoes (<https://www.yara.us/crop-nutrition/tomato/managing-tomato-taste/>).

Vegetable seed breeding companies offer different types of tomato varieties to market. Some varieties perform best in open field or in greenhouse production for the fresh market while others are

more suitable for processing purposes. Dual purpose varieties are suitable for both the fresh market as well as processing, but do not excel in either market segment.

Important characteristics that international breeders look at in their breeding programmes include whether they are early – mid – or full season varieties, their disease tolerance, viscosity and Brix number. Also uniformity is of importance for mechanisation.

In order to obtain the highest Brix number, vegetable seed breeders can focus on breeding specialized lines of tomato varieties with high Brix. Since margins in the processing tomato sector are low, only a limited number has tomato varieties specifically bred for processing. The best, most highly specialized varieties for processing are sometimes bred by international off-takers themselves, like for instance Heinz. In countries like Algeria often dual purpose varieties are therefore used which leads to less optimal results in the processing phase. It also brings about a risk for the processor (and an opportunity for the farmer) that tomatoes can be sold to the fresh market in case of higher prices.

In Algeria the majority of the produced tomatoes for the processing industry are dual purpose varieties from breeders Syngenta, Nunhems and Clause, but industrial varieties are available in the market as well.

4 Tomato processing value chain stakeholder mapping

4.1 Introduction

The following stakeholders are identified as important stakeholders in the value chain for this study and will be described in more detail in the following paragraphs:

- Private sector companies:
 - Importers and distributors of seed and other inputs
 - Nurseries
 - Farmers and investors producing tomato for processing (>10ha)
 - Logistics companies
 - Processors
 - Off-takers
- Sector associations and organisations
- (Local) government bodies
- Knowledge and education institutes

4.2 Importers and distributors

Imports of agricultural inputs and technologies are generally facilitated by the government. A government instruction dating from October 2022 allows the import of all types of agricultural equipment, less than five years old, as well as its spare parts by individuals or companies.

The majority of all the hardware and inputs that is used in the sector is imported by importers. The importers are licensed to buy and sell imported goods. They are active in negotiating with foreign suppliers, the import and distribution within the country. They supply the imported goods to local distributors - also called dealers or retailers- or to nurseries, farmers or processors directly. Retailers of (agricultural) inputs ensure the marketing and often the technical support which allows them to develop their customer portfolio at the level of their respective regions.

The two most important factors to acknowledge that are mentioned by importers are the time path and procedures that need to be followed.

For every import a permit is required and any organization wanting to apply for the permit will need to have a VAT number, something many farmers do not have. The import of agricultural inputs is a relatively quick process but for hardware it takes several months before the application is handled. Upon arrival of each imported shipment, all goods are checked completely. The import process for hardware is rather complicated and a time consuming process, according to importers the regulations have improved since 2 to 3 years though.

There is no customs tax for imports from Europe, while this tax is approximately 15% for import from the US and China, and 5% from Turkey. For import tariffs the rules are highly detailed for different types of hardware, on separately shipped spare parts the import tariff is very high.

The origin of imported goods differs for the different types of inputs and the hardware. There are more than 50 companies active in imports for the processing tomato sector and local contacts estimate that approximately 20 of them import from the Netherlands.

4.2.1 Inputs

When it comes to agricultural inputs, nearly 95% of the hybrid vegetable seed is imported into the country. The agricultural market is supplied with vegetable seeds by a number of importers through exclusive contracts on certain brands. Six countries have held the bulk of Algeria's vegetable seed supplies for two decades (89%). These are the Netherlands, France, Denmark, Belgium, the United Kingdom and the United States of America and the Netherlands is among the top 3 of these suppliers. For tomato processing, the majority of seeds are supplied by breeders Syngenta, Nunhems and Clause.

Plant protection products are supplied by multinationals that produce in Europe, Asia and America such as Syngenta crop protection, Bayer crop science, BASF chemical, Corteva. These companies supply Algeria with generic products and have representatives in the country in the form of a liaison office. Algerian companies such as Profert, Agrichem, Srid, Agroseed, Doudah, Filahya, Casap d'Alger, Aci, Agro Mosta, Debbane and Agrorayan provide import and distribution. These companies are the main actors in the import and distribution of phytosanitary products and seeds in Algeria.

In terms of integrated pest management (IPM) and to meet the needs of organic farming, the solutions offered by the input market are very limited or not available, especially beneficial organisms are lacking. The biological products that are offered in the market include organic fertilizers and hormones. For these products cooperation exists with German suppliers and according to the suppliers the demand for these products is high. Also bio-stimulants from the Netherlands are applied (Agro Solutions) and bumblebees are being used that originate from Koppert but that are supplied via other intermediate European companies.

Fertilizers are also imported, however, two Algerian companies, one public (Fertial) and the other private (Profert) contribute to the supply of fertilizers to the market as well. Fertial is a company resulting from a partnership between the Algerian group Asmidal and the Spanish group Grupo Villar Mir with an annual capacity of one million tons of ammonia. Profert is a private company that produces fertilizers and provides Algerian farmers with different ranges of solid and soluble fertilizers. The only foreign company present in Algeria is Timac Agro, a subsidiary of the Roullier group from France, specializing in the production and distribution of fertilizers of biological origin which promote the vision of sustainable agriculture.

Nurseries also work with imported substrates for their production of seedlings, although they often make a mixture between locally available materials and imported products. Other inputs include materials for the processing plants. During the visit, packaging solutions for tomato pulp samples were shown that were imported from the Netherlands, other packaging is sourced partly local and partly from neighbouring countries like Tunisia.

Distributors of inputs have been facing difficult times in 2023 because of the aforementioned drought during the 2023 campaign. They provide inputs to farmers on credit without an official contract and only get paid after harvesting. For 2023 that meant that many distributors did not receive payment from a significant part of their farmers, while they do have to pay the importers of the inputs. One interviewed distributor stated that during the previous dry years he made 10% loss and in 2023 50% loss. Many distributors are 'cleaning' their customer portfolio and choose their clients strategically, for instance only clients with a diverse portfolio of activities to ensure that cashflow will be available. Part of the distributors work together with the processors for the inputs for processing tomato

production. Processors provide a list of required inputs for their farmers and sometimes the distributors also receive their payment from the processor.

4.2.2 Hardware

Hardware that is imported for the tomato processing sector consists mostly of greenhouse technologies and seed planting lines for the nurseries, mechanization for the farmers and the equipment and installations of the processing plants.

The technology used in the Algerian processing factories is often imported from Italy. Italian companies such as FBR ELPO and CFT Rossi & Catelli are considered leading companies in designing machines and lines for tomato processing. Such lines include machines for product receiving and sorting, enzymatic inactivation, hot break and cold break technologies, juice extraction, pan concentration, evaporators, sterilization and aseptic filling. Also from Italy are industrial steam kettles from companies such as Mingazzini, that supply steam generators, hot and superheated water boilers, recovery boilers, steam accumulators, exchangers and air vents. Suppliers of digital energy management and automation solutions to the processing plants include companies based in France such as Schneider Electrics.

Farm mechanisation is often imported from Italy as well, with machinery for planting and harvesting. Companies such as Guaresi Spa offer different types of harvesters, sometimes also used machines, in combination with assistance, overhauling and spare parts service. For soil preparation usually farm mechanization of low to medium cost technology is used, often imported from Turkey. Irrigation materials are imported from various countries, the visited distributors had products from Italy.

Imports of hardware for the nurseries in the Annaba region mainly comes from Turkey, Italy, France and Spain. It includes tunnels, Canarian greenhouses and multispans greenhouses and their interior technologies. There are local suppliers of basic greenhouses but especially the multispans greenhouses are imported from Europe. Greenhouse technologies for ventilation, heating and cooling were found that are supplied by companies based in Italy such as Pericoli and fertigation equipment from Spain, from companies such as AZUD and MSC Fabricas Agrícolas.

Other machinery and systems were seen coming from Italy, such as Da Ros or Atlantic Man. This includes specific nursery technologies for all the steps in the nursery related from destacking of planting trays and labelling of pots, to peat processing and the subsequent seeding, grafting, transplanting, overhead irrigation, and washing and disinfecting.

4.3 Nurseries

An estimated 80 to 90% of the young plants produced for the tomato processing sector come from nurseries. Farmers increasingly prefer to buy seedlings from nurseries rather than to produce their own seedlings. There are seven large nurseries which dominate the seedling production market and supply almost 95% of the nursery produced tomato seedlings to the sector.

According to the nurseries there are no problems with germination and germination rates are said to be around 80 to 90%. One of the top nurseries claims a 95-98% germination rate of the seeds. The success rate at the farmer after transplanting is estimated at 95% by the nurseries.

The farmers plant the produced seedlings in phases. Nursery generally demand a 50% advance payment before the start their processes and demand the remaining 50% to be paid when farmers

come to collect the seedlings. They have suffered less from unpaid bills than distributors of inputs but also observe an increased percentage of unpaid bills last year.

The infrastructures used in the nursery vary from tunnels, Canarian greenhouses to multispans greenhouses depending on its functionality and the location. The nurseries are often a few hectares in size and are equipped with modern technology such as flexible and automated ventilation, screening systems, blowers and gas heating systems, automated fertigation, sprinklers and basic cooling systems. Nurseries are looking for ways to manage the climate in the greenhouse better and remove the extremes in order to reduce plant stress levels. Besides that, optimizing fertigation management was mentioned as a topic of development.

The nurseries are very receptive and open to partnership and new technologies. They usually do not have a working relationship with the processors.

Besides producing tomato plant seedlings, the nurseries in the north-east also supply a lot of seedlings for the production of fruit such as melon and clementine to the sector.



Photo 6 and 7 Tomato seedlings and a nursery overview (source: Pépinière Horticole Groupe Gharbi)

4.4 Farmers and investors

Industrial tomato is cultivated in majority by small to medium-sized producers. Tomato farm size is classified in three categories: small (< 5 ha), medium (5 to 10 ha) and large farms (> 10 ha). Figures from 2018 state that small farms then represented 2,006 growers, medium farms 1,454 growers and large farms presented 284 growers (Benmehaia, 2018). More recent figures also indicate that most of the tomato farmers cultivate areas between 5 and 10 hectares, with 63% having less than 5 hectares, and have access to land through informal renting agreements (Assassi et al., 2020; Assassi, 2023).

The small-scale farming sector usually does not have the capital needed to make large investments. The small farmers are unable to intensify production, they are rarely organized, have poor access to credit, low qualifications and therefore find it difficult to take advantage of technological advances.

The very large farmers have production areas between 50 and 200 hectares and use mechanization for all processes including soil preparation, planting and harvesting.

Production is done exclusively in the open field with hybrid tomato varieties, mostly dual purpose varieties. Harvesting of industrial tomatoes is done all at once. This is mostly done manually, although this may change in the future now that labour is gradually becoming a problem. At present approximately 30 to 40% of the tomatoes for processing is being harvested mechanically.

For processors the problem with manual harvesting is that it allows for a lot of waste and debris like stones within the harvested tomato. According to farmers a disadvantage of mechanized harvesting – besides the investment - is that it can only be used by day light and not under rainy or highly humid conditions.

The producers operate as contract farmers to the processors. In general the relationship between farmers and processors is suboptimal. There is an overall lack of confidence between the parties that does not help in optimizing cooperation. Many farmers complain about the prices they receive and the payment period is usually much longer than acceptable. Farmers state they are obliged to supply their tomatoes within 2 days after harvesting and are not allowed to store them, while the waiting times for the trucks with harvested tomato at the factory in peak season is often a few days up to a week. During this period in the heat, the tonnage of the tomato is reduced by evaporation and the resulting payment is lower as well.

4.5 Logistics companies

The logistic service providers that are active in the sector are often arranged by the farmers themselves during harvest period. The trucks are usually 20-tonners with open loading boxes that transport the tomato in bulk without packaging or protection.

4.6 Processors

In general the processing factories are known to be well structured, modern and organized. Besides processing the fresh products, the processors are also responsible for the distribution to the local and export market. There is a lot of competition between the processors to obtain sufficient supplies of tomato for processing. As described in paragraph 3.4, data provided by processors shows that contracted acreages vary between 350 and 900 hectare, and 50 to 200 farmers over the past years.

One of the visited processors explained they work with 84 farmers that together produce tomato on 850 hectare. They consider the selection of the farmers as a very important factor in their success as it gives them some control over the resulting tomato volumes that will be supplied to the factory.

They pre-finance a small amount for the purchase of inputs as an insurance that the farmer will feel obliged to actually deliver the agreed on tomato volumes to them.

The level of support that processors offer to farmers varies. Several processors organize the supplies of inputs as part of the contract farming. This includes seeds, fertilizers and crop protection chemicals and sometimes the processor provides seedlings instead of the seeds.

Training and technical support is done by the suppliers of inputs. At present there is no cooperation between the supplier and processor in guiding and supporting the farmers, but the interviewed processor agreed that this could be an option.

The processors buy directly from farmers, but they also often work with independent collectors to whom they pay fixed commissions. One of the sector stakeholders explained that farmers decide to sell their production to collectors when they prefer a lower price but direct payment. This can be attractive in situations of very long waiting times at the factory and insecurity of the payment duration. The collector can help a processor in getting access to sufficient volumes of tomatoes. Although there is a lot of competition between processors when it comes to sourcing of tomato, there is also some cooperation; some processors source triple concentrate from others.

4.7 Offtakers

The clients of the processing factories are mainly the wholesaler, who supplies the smaller shops and supermarkets with their products. According to the processors the market asks for a good quality paste from a well-known brand. One of the processors that was visited, Cara, works with a large



international brand based in Spain, JB Natural Foods, and markets tomato paste at 28% concentration level under the name Jumbo. Another brand they work with is Rachrach under which name they market tomato paste at 22% concentration and the premium quality of 28-30% concentration. Other processors such as Lala Salha and Izdihar market their products under their own company name.

The tomato paste is marketed as a 100% natural product as it consists of tomato only and has no additives. Biological production of the tomato is not demanded for this 100% natural product declaration. All factories collect samples from their production processes for testing. Besides the sales of the tomato paste, also triple concentrate is being marketed. It can be produced year-round and can be stored in large cans for 3 years.

Photo 8 Algerian tomato paste

4.8 Sector associations and organizations

An important body in the sector is the National Interbranch Council of the Tomato Industry (CNIFT). CNIFT represents the private sector with the government, it is working closely together with the Ministry of Agriculture and Rural Development (MADR) and provides advisory on policies. CNIFT representatives are usually producers themselves with a large experience and network in their respective region. Their work for the sector is volunteer work.

The sector also has insurance funds that operate regionally and work together with the Directorate of Agricultural Services (DSA) offices. The insurance funds are funded by government and allow insurance against disasters including drought, fire, floods, hail, wind and sirocco (a Mediterranean wind that comes from the Sahara and can reach hurricane speeds in North Africa). At present insurance is not yet obliged and the rate of farmers taking out agricultural insurance is estimated at less than 2% (<https://algeriainvest.com/premium-news/agriculteurs-sinistres-la-cnma-insiste-sur-lassurance-agricole>). Sector stakeholders mention the insurances are not well developed enough and do not provide sufficient coverage.

4.9 (Local) government bodies

The government plays an important role in the Algerian agriculture sector. There are several institutes that fall under the supervision of the Ministries that provide support to farmers on all aspects from production to sale. The most important bodies are the Agricultural Chamber (Chambre d'Agriculture) and the Directorate of Agricultural Services (DSA), both represented at local level.

The Agricultural Chamber contributes to the development and implementation of the national policy for the development of agricultural activities and their diversification while protecting the professional and social interests of its members, the farmers. The Chamber represents the farmers and the sector to the government, but also receives guidelines and instructions from the government. The DSA is the representation of the Ministry of Agriculture and Rural Development in each wilaya (province). The DSA identifies the agricultural development objectives of the wilaya and promotes agricultural investment. It provides support and guidance to the agricultural sector.

Important in the financing of the tomato processing sector is the Agriculture Bank for Rural Development (BADR). BADR offers farmer several types of agricultural credits, for the purchase of inputs, for activities related to processing and valorisation of products, and for investments in hardware such as greenhouses and infrastructure required for processing and valorisation.

The offered credits are subsidized (0% interest) or partially subsidized. Besides the availability of credit and loans provided by government, there is also a government insurance fund, the Caisse régionale de mutualité agricole (CRMA).

4.10 Knowledge and education institutes

There are several Algerian universities and colleges that are involved in the sector. Locally the University of Guelma and the Badji Mokhtar University in Annaba could play a role in the tomato processing sector but the main activities in this field are found with other institutes. The École Nationale Supérieure d'Agronomie (ENSA), a smaller agronomic university based in Algiers, is active in researching the impact of the subsidy of the state on contractual improvements and farmers' income. ENSA works together in this with international institutes such as the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and the Institut de recherche pour le développement (IRD) from France. In previous years ENSA has also worked together with Wageningen University to develop a model greenhouse for peri-urban food production for the cities in the northern region of Algeria.

The University Mohamed Khider Biskra have been active in researching production contract performance in the tomato processing industry, which means the fulfilment of the contract between the grower and the tomato processor. The same researchers also analysed the vertical relationships and food supply chain coordination in the processing tomato sector of Algeria on behalf of ENSA.

The Centre for Research in Applied Economics for Development (CREAD) that is based in Algiers has developed decision support tool for farmers producing industrial tomatoes in Algeria. The decision support tool is aimed at providing advice to optimally partition certain amounts of money kept on reserve to cover the costs of operation for the different activities in production.

5 Business opportunities

5.1 Introduction

As can be concluded from the previous chapters, the processing tomato value chain can use modernization and optimization throughout the entire chain to optimize the use of scarce water, reduce large post-harvest losses, and optimize processes and quality levels. Storage, logistics, planning and improving cooperation between chain partners also play an important role. Climate change and rising production costs contribute to the need to modernize the sector as well. The Netherlands can play an important role several aspects of the modernization processes. Business opportunities for cooperation between the Dutch and Algerian private sector lie in the field of knowledge, technologies, materials and inputs. In the following paragraph the business opportunities are described at the level of the different actors in the value chain.

5.2 Nurseries

For the nurseries, that produce the tomato plant seedlings for the sector, the business opportunities for the Dutch private sector include the following:

- Input supplies
- Greenhouses and greenhouse technologies
- Nursery specific equipment and materials
- Knowledge transfer

The input supplies include fertilizers and crop protection, whereby there is especially room in the market for biological products, and substrates. For a significant part of the nurseries this opportunity is indirect as they buy their inputs from an importer/distributor and do not import themselves. Besides inputs, technologies for all the steps in the nursery related from destacking of planting trays and labelling of pots, to substrate preparation and the subsequent seeding, grafting, transplanting, overhead irrigation, and washing and disinfecting are needed.

With respect to larger investments the greenhouses itself and their equipment form an interesting opportunity. This mainly involves Multispan greenhouses; climate management systems including ventilation, screening, cooling, and heating; fertigation and irrigation systems, including rain water collection and water storage systems. The main topics for knowledge transfer and skills development lie in the field of optimization of the fertigation and climate in the varying greenhouse compartments. Amongst the nurseries there is willingness to pay for knowledge and training.

5.3 Tomato producers

For the open field production of the processing tomatoes, the main opportunities are:

- Input supplies
- Mechanisation
- Irrigation systems
- Technical training

For farmers, input supplies again include (biological) fertilizers and crop protection, and seed, specifically hybrid industrial tomato varieties and crop rotation crops such as onion and beans. Only the very large farms will have a license to import themselves, for the others the route will go through importers/distributors.

For Dutch companies active in mechanization, opportunities lie in the mechanization for soil preparation processes such as spaders and preparation of planting beds. Besides that, supply of

irrigation systems are identified as an opportunity since the majority of the farmers should either start with irrigation or optimize the irrigation system they are using. There will be an interest in irrigation systems varying from pivot, overhead sprinklers to drip irrigation. Ideally climate-smart irrigation would be introduced, using drip irrigation combined with sensors and knowledge of crop needs during the different stages of the growth process to optimize water use efficiency and production results.

Technical training can include all aspects of tomato production with specific attention for the industrial market needs, including production planning, optimization of water use efficiency, pest and disease management, harvest and post-harvest management, including sorting and grading. The assumption is that the majority of the farmers is not open to paying for training, only the large scale farmers/investors, especially the ones that also grow crops for export.

5.4 Processors

The business opportunities on the level of the processors can mainly be found in:

- Input and possibly hardware supplies
- Laboratory equipment or services
- Capacity building

With respect to inputs and hardware supplies, the opportunities that were identified are the packaging and storage solutions that the processors use for the samples they take along the process and their (semi-)final products. Some of the processors have their own laboratory for basic analysis procedures, they also send samples to European laboratories for additional analysis related to quality based on random checks.

In order to optimize the quality level of the value chain, more quality assessment and control would be included in the supply chain of the processors. Therefore also opportunities exist for Dutch laboratory service providers for assessment of the quality of the sourced produce, the processing products and processes.

The general topics identified for capacity building include overall process coordination, factory and logistic process management and quality management. Of specific interest would be capacity building on intensified contract farming including provision of farmer services.



Photo 9 Sample packaging

6 Roadmap for the tomato processing value chain

6.1 Introduction

In order to identify the key elements that enable further development of the tomato processing value chain of northern Algeria, a roadmap is prepared including an analysis of the strengths, weaknesses, opportunities and threats (SWOT) and recommendations for an approach to establish sector development, linked to the opportunities the Dutch private sector has to offer.

6.2 Strengths, weaknesses, opportunities and threats

Insights obtained from the desk study, visit programme and interviews on the strengths, weaknesses, opportunities and threats (SWOT) specifically for the tomato processing value chain of Algeria are presented in figure 7. The highlights include:

- Strengths: Reasonably well functioning sector with room to expand and government support
- Weaknesses: Outdated knowledge and technologies applied in combination with sub-optimal cooperation between farmers and processors on various topics
- Opportunities: Growing local market and opportunities for product diversification and possibly export in the future
- Threats: Climate change; drought requires drought resistant varieties and investment in irrigation

The SWOT analysis of the processing tomato value chain and the opportunities the Dutch sector has to offer to support in its further development, can be linked on the level of each value chain actor to establish the road map for joint efforts in this sector.

6.3 Recommendations for sector development with Dutch involvement

From previous studies and experiences the importance of 'the business case' as the starting point for horticulture sector development processes has been accepted as the key to a sustainable approach (Joosten, 2014). Since the business case is already established, the recommended approach therefore considers an improvement in profitability for each actor in the value chain leading to an overall improvement of sector performance. However, during the study it has become clear that besides the individual business cases of the value chain actors, also the current ways of cooperation between the actors are limiting the development of the processing tomato sector of Algeria.

6.3.1 Sector development through contract farming

In many countries, the development of contract farming plays a significant part in the growth and development of the agriculture sector. To optimize value chain performance, the effectiveness of contract farming hinges on contract enforcement by stakeholders. Non-enforcement, especially side selling by farmers, can destabilize buyer-seller relationships, impeding transaction coordination and discouraging firms from agricultural engagement (Assassi, 2024).

For the context of the Algerian tomato processing subsector, strengthening the cooperation structures throughout the value chain will also benefit value chain performance. Besides professionalization of the cooperation structures (contract fulfilment), it seems that trust between sector stakeholders needs to (re)established. Both aspects will be serviced by the implementation of an improved version of the current way of contract farming.

STRENGTHS

- Large available acreage, reasonably well functioning sector
- Modern nurseries with ambition to improve quality
- High-tech processors with excess technical capacity, basic quality measurement systems
- Large domestic market for various processed products
- Active sector stakeholders with interest to improve and develop
- Government support to ensure contract farming, minimum price regulation, market protection
- Government subsidy on fertilizer, irrigation materials and produced industrial tomato for registered farmers
- Natural gas reserves; low power costs
- Low costs for land and water
- Access to finance

WEAKNESSES

- Low productivity level and low water use efficiency
- Very short peak season at processors; no spread production planning
- Outdated horticultural technologies and knowledge; level of mechanization and automation is low, irrigation limited
- Contract fulfilment and enforcement inadequate; contract without legal value
- Lack of control for processors on variety choice (industrial varieties) and supplies, lack of trust between farmers and processors, insufficient process coordination
- Delayed payment terms, (periodic) costs vs sales price imbalance
 - Investment is difficult on rental land, especially with informal renting agreements
 - Investments per season, inputs purchased on credit
 - Suboptimal availability of certain fertilizers, organic inputs, hybrid seeds
 - No cold storage or refrigerated logistics
 - No farmer organization; no negotiating power on input purchase or market pricing
 - Easy of doing business (157 in 2019); inefficient government, bureaucracy

SWOT Analysis

OPPORTUNITIES

- Opportunities for product differentiation
- Interest from the EU market for export
- Growing (world) population creates an increasing demand for processed vegetable products
- New regulations to improve business climate
- New law allows import of 2-nd hand equipment (max 5 yrs old)

THREATS

- Increasing production costs due to worldwide increased prices for horticulture inputs
- Impact of worldwide economic developments and inflation on purchasing power
- Climate change; increase in frequency of warm days, higher extreme temperatures, - especially for western Algeria: decreasing precipitation totals and reduced length of precipitation episodes

Figure 7 SWOT Analysis

At present the contracts between farmers and processors are merely used as registration document for government subsidy and have no legal value. It is recommended to bring the current contract farming to a higher level by professionalizing the contracts and expand their reach through:

- Working with legally binding contracts for farmer- processor cooperation
- Acceptance of contract enforcement on both sides (supply and offtake obligations, based on specified conditions)
- More support to the farmers and thereby control over the supply chain process for the processors by providing guidance on (or setting requirements for):
 - Production planning; each farmer fitting into a grand scheme organizing the supply chain to the factories in a better way
 - Selected inputs: hybrid industrial tomato varieties, ideally with improved drought resistance, and good quality (biological) fertilizers and crop protection
 - Production and harvesting technical knowledge and skills (Good Agricultural Practices), ideally including (an increased) assessment and control of the quality of the sourced produce, the processing products and processes. This could possibly be based on a (locally developed) standard that ensures a higher level of food safety
 - Periodic support and check-up visits throughout the growing season (ensuring contract enforcement)

Several Dutch private sector parties and organisations have experience in supporting the above described processes in a comparable context and can aid the sector with development of the sector through implementation of professionalized contract farming schemes.

6.3.2 Sector development by improving financial arrangements

Another important aspect that is holding back sector development in many developing and upcoming economies is the access to finance and financial arrangements that are available for the actors in the value chain. Building on the professionalization of the contract farming schemes, the element of finance could be added to facilitate distributors, farmers and processors. In the current situation farmers often buy their inputs individually and on credit basis at distributors. They tend to stay away from taking loans from the banks because of religious reasons and because of the complexity of the processes (Hoogerwerf, 2023). Some processors wish to or have already implemented financial support on the aspect of inputs. Arranging pre-financing for (specified) inputs or providing the required inputs is a recommendable service that can assist in improving the performance of the value chain.

What could be included in the contract farming is a payment scheme that allows for payment of distributors besides payment of the farmers. The scheme should set clear conditions on prices per quality level and moment(s) of payment, within a limited time frame after product supply. In this way the unrest with importers/distributors and farmers over payments can be diminished. For importers/distributors this is the case for unpaid inputs by farmers so that funding is available for them to import or order new inputs for the new season in time.

In addition to improving access to finance and the financial arrangements, training on financial literacy for farmers could be instrumental in supporting farmers to better understand their business activities, the impact of certain decisions they make and the payments they receive from processors.

On these topics there are also several Dutch private sector parties and organisations available that have experience in supporting the above described processes in a comparable context and can aid the sector with development of the sector.

6.3.3 Sector development through implementation of Dutch technologies

Besides improving the current way of contract farming by upgrading and streamlining the cooperation structures and optimizing the financial arrangements in the sector, recommendations for the individual actors in the value chain are also in place when it comes to improving productivity, quality and resource-use efficiency levels. Here the Dutch sector can play an important role in providing technology and knowledge to the sector stakeholder.

In chapter 5 the business opportunities for the Dutch private sector at the level of nurseries, farmers and processors have been described. That overview gives information about the general topics of products and services the Netherlands has to offer to Algeria. Essential for sustainable sector development and performance is the key expertise the Netherlands and affiliated local partners have on:

- Tomato breeding and selection for specific climatic conditions; although tomato breeding for industrial purposes is not priority for most Dutch breeders, companies with a Dutch history such as Syngenta and Nunhems have suitable industrial varieties for the Algerian sector. In this case it would be important for further development to identify specific industrial tomato varieties that are better drought and diseases resistant, but that also allow for widening of the transplanting window. That means they can be transplanted under different climatic conditions to extend the period of harvesting and supply to the processors. Part of the planted varieties should allow for flowering setting under hot conditions so that they can be transplanted later. Possibly earlier transplanting can be done with varieties that are better resistant against cold conditions and the TYLC virus.
- Greenhouse climate management optimization; nursery performance in terms of germination rates and later on the transplanting success rate is said to be very good, still attention can be given to improving greenhouse climate management. At present nursery owners are already aiming to improve climatic conditions under extreme conditions and with the expected trend in climate change this may become even more important in the future. Also the resource-use efficiency of nurseries can be improved. Dutch solutions for smart irrigation in greenhouses including collection, cleaning and re-use of drainage water are very relevant for the Algerian nurseries, as well as rain water harvesting and storage solutions. Improved overall water management can assist in the desired climate management optimization inside the greenhouses, and it will improve the quality and strength of the produced seedlings.
- Climate smart irrigation technologies for open field production; for many farmers the first step to make is the investment in a drip irrigation system. The next step should involve automation of the system in order to optimize irrigation based on sensor information and also automate the supply of fertilizer with the irrigation water. This will greatly improve the production quantity, quality and water use efficiency of the open field tomato production.
- Mechanization; the Dutch agri-sector has a long history in mechanization for open field cultivation of crops, which is nowadays also linked to satellite based imagery for precision agriculture. Precision agriculture uses technologies such as GPS or automation to make farms more efficient, for example, farmers can use auto-steering equipment to precisely plant a field. Unfortunately it seems that several of the Dutch suppliers of mechanization do not have tomato as a focus crop. With the assistance of the Dutch, the first important step in the processing tomato sector of Algeria would thus be to increase the level of mechanization in the sector for soil preparation. Proper soil preparation by using spaders and making planting beds form the basis of a good production season. Also recommended is to increase the level

of mechanized harvesting so that more uniformity will be reached in the harvesting process, planning can be improved and the level of waste and debris like stones will be minimized. Further automation and optimization of the open field production of tomato can be considered in the future. Since investments in mechanization are high, it could be offered as a service by a central company such as a distributor or a processor. Second hand equipment from the Netherlands can also be interesting.

- Quality assessment and control; the processing tomatoes are currently supplied to the factories without quality assessments that go beyond visual inspection. Tomatoes are transported and processed in bulk, there are no traceability systems, standards for Good Agricultural Practices or demands for certification in place. A first step towards an increased level of food safety would be the quality assessment of tomato production and supply chain control with the help of laboratory analysis. Several Dutch labs operate in the agriculture sectors worldwide providing high level services for quality assessment of the sourced produce, the processing products and processes. Processors could play a central role in facilitating quality testing and setting standards.

7 Conclusions and recommendations

Based on the outcomes of the study the following conclusions can be drawn:

- The sector is regarded as a strategic value chain by the Algerian government and although some its supporting measures are under debate, they protect the market from cheap foreign products, financially support the stakeholders by minimum price settings and with subsidies, and facilitate their cooperation through providing cooperation contracts for farmers and processors.
- Government policies of 2017/18 led to organization of the processing tomato value chain and improvement of its performance and size. According to government officials production of double-concentrated tomato paste increased from 20,000 tonnes in 2018 to more than 80,000 tonnes in 2021, and production of triple-concentrated tomato paste from 9,000 tonnes in 2013 to more than 70,000 tonnes in 2021.
- In 2022-2023 the supply of tomatoes to the processors has not been stable. In the 2022 season a decline in production acreage was recorded, as farmers moved to other crops due to sales price imbalances following the increasing prices for horticulture inputs, but most importantly, the chronic delay in payment. The year 2023 was a difficult year as well due to severe drought in spring.
- During the past years, sales prices for the industrial tomato have gradually been risen, making the production more attractive for farmers again, and government is providing extra financial support for irrigation equipment through subsidies.
- Based on the figures the processors are providing and information from other stakeholders, there is sufficient room in the market to grow in a profitable way. The growing population and increasing demand for processed tomato products creates opportunities for the tomato processing sector to grow, develop and increase its profitability.
- The overall observation is that the processing tomato value chain can use modernization and optimization throughout the entire chain to optimize the use of scarce water, reduce large post-harvest losses, and optimize processes and quality levels. Storage, logistics, planning and improving cooperation between chain partners also play an important role. Climate change and rising production costs contribute to the need to modernize the sector as well.
- At present production levels in the sector are mediocre and the technologies and knowledge applied are outdated and require modernization; mechanization and automation level is low and farmer education on technical and financial aspects is highly demanded to increase the professional level of production, the yields and quality level.
- In recent years dry spells have left a strong mark on sector performance and current projections for climate change suggest an increase in the frequency, intensity and duration of droughts accompanied by a decrease in precipitation. Implementation of climate smart irrigation and the use of hybrid varieties with increased drought resistance, will significantly improve the yield results and water use efficiency of the sector.
- Processing results are suboptimal due to the used tomato varieties (low Brix) and poor pre-selection and high waste levels in the supplied volumes. The use of industrial varieties and mechanization and/or increased quality control at the farmers will improve the production results of the processors. Quality control with respect to chemical residue levels should be improved as well.
- Many processors operate at full capacity 1 or 2 months per year and have excess capacity the remaining months. Product diversification, improved production planning and lengthening of the tomato supply season by using specific varieties will allow for an increased profitability for the processors.

- The development of contract farming plays a significant part in the growth of the sector. Increased coherence within the value chain is needed to tackle challenges with production volumes and quality versus processing capacity and product requirements, logistics, contract fulfilment and buyer-seller relationships. At present, the level of trust between producers and processors is low and an improvement of this relationship will be fundamental for improving sector performance.
- The sector provides interesting opportunities for Dutch suppliers ranging from input supplies, greenhouse and nursery specific technology, open field irrigation systems, mechanization, packaging and storage solutions, and a lot of training and capacity building on technical, financial, logistic, quality and process management and contract farming aspects.
- The recommendations for further development of the sector include the following routes:
 - Sector development through professionalized and expanded contract farming, including legally binding contracts for farmer- processor cooperation, acceptance of contract enforcement on both sides (supply and offtake obligations), more support to the farmers -and thereby control for the processors- by providing guidelines and support during production, including an increase in assessment and control of the quality level of the sourced produce, processed products and processes
 - Sector development by improving financial arrangements, whereby access to finance or credit for farmers, payment of distributors and payment terms and conditions are improved
 - Sector development through implementation of Dutch technologies, which includes the aspects of tomato variety breeding, technologies for greenhouse climate, fertigation and water management, climate smart irrigation technologies for open field production, mechanization, and quality assessment and control

References

- Assassi, S (2017). L'agriculture contractuelle dans la filière tomate industrielle : logiques d'acteurs et effets sur leurs performances Cas de la Conserverie Amor Benamor (CAB) dans la wilaya de Guelma (Algérie). Doctorate thesis, ENSA, Algiers
- Assassi, S, Daoudi, A., Colin, J.P. (2020) Quelle place pour les petits exploitants dans l'agriculture contractuelle ? Le cas de la tomate industrielle en Algérie. Cahiers Agricultures, 29, 26.
- Assassi S, Souillier G (2023) Do state-subsidized contractual arrangements improve farmers' income? Empirical evidence from Algeria. Canadian Journal of Development Studies
- Assassi S, Kleftodemos G, Benharrath O, Bayraktar A (2024) State subsidies as a hybrid contract enforcement mechanism in Algerian tomato value chain: an alternative where public courts and private companies fail?
- Benmehaia MA, Brabez F, Benharrath O (2017) Production contract performance in tomato processing industry: analysis of Algerian case. International Journal of Food and Agricultural Economics, Vol. 5 No. 2, 2017, pp. 97-108
- Benmehaia MA, Brabez F (2018) Vertical relationships and food supply chain coordination: The case of processing tomato sector in Algeria.
- Bouزيد A, Zelmat M (2018) Decision support tool for farmers producing industrial tomatoes in Algeria. ISB-INMA TEH' 2018
- Crumpler, K. et al (2022) Regional analysis of the nationally determined contributions in the near east and north Africa. Opportunities and gaps in the agriculture, water and land use sectors, FAO
- Daoudi, A. (2021) Impact du Covid 19 sur les systèmes alimentaires en Algérie. Rapport FAO.
- Hoogerwerf, F. and Amrouni, H. (2023) Greenhouse Horticulture Algeria, Quick Scan. Commissioned by the Agricultural Offices of the Dutch Embassies in Algiers and Rabat, financed by the Dutch ministry of LNV
- Joosten, F.J. (August 2014); Picking the fruits; making horticulture sector development in emerging economies more successful. Discussion Paper. CDI, Wageningen UR.
- Langenberg, V. et al (2021) Water in agriculture in three Maghreb countries, Status of water resources and opportunities in Algeria, Morocco and Tunisia. Commissioned by the Agricultural Offices of the Dutch Embassies in Algiers and Rabat, financed by the Dutch ministry of LNV
- <https://algeriainvest.com/premium-news/agriculteurs-sinistres-la-cnma-insiste-sur-lassurance-agricole>
- https://www.lemonde.fr/en/le-monde-africa/article/2023/07/20/north-africa-is-used-to-the-heat-waves-europe-is-now-experiencing_6060399_124.html
- https://www.tomatonews.com/en/en/algeria-might-start-importing-tomato-paste-once-again_2_1866.html
- <https://tradingeconomics.com/algeria/balance-of-trade>
- <https://www.yara.us/crop-nutrition/tomato/managing-tomato-taste>
- <https://www.fbr-elpo.it/en/>

<https://www.cft-group.com/brands/rossi-e-catelli/>

<https://www.mingazzini.it/>

<https://www.se.com/ww/en/work/solutions/for-business/food-and-beverage/>

<https://www.guaresi.com/>

<https://www.pericoli.com/en/>

<https://tech.atlanticgroup.it/>

<https://azud.com/en/>

<https://da-ros.com/en/>

Appendix 1 Contact list of meetings and field visits in Algeria

	Name of organization	Type of organization	Contact person
1	CARA	Processor	Racherache Boubakeur
2	CARA	Processor	Maouche Khaled
3	Chamber of Agriculture	Sector organisation	Saci Labadliya
4	Djilali	Nursery	Abdelouahab Yahyaoui
5	ENSA	Knowlegde institute	Ali Daoudi
6	Gherbi	Nursery	Med Fouzi Hanoune
7	Izdihar	Processor	Ali Seif-Eddin Mansouri
8	Kerrouma	Distributor	Trai Abdelkrim
9	Lala Salha	Processor	Kamel Mansouri
10	Lala Salha	Processor	Amine Abderahim Mansouri
11	Lala Salha	Processor	Houda Benouis
12	National Interbranch Council of the Tomato Industry	Sector organisation, farmer	Azdine Berken
13	Regional Fund for Agricultural Cooperation	Government organisation, farmer	Mohammed Laouabdia
14	SMCI	Importer/distributor	Reda Boomaza
15	-	Expert/consultant	Samir Belhawchat
16	-	Expert/consultant	Fakhr Aldin Mousawi
17	-	Distributor	Tahar Zair
18	-	Farmer	Mohamed Layeb
19	-	Distributor	Amar Doubabi
20	-	Farmer	Ayad Nacer

In addition a few sector stakeholders shared their views on an anonymous basis.

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