



وكالة تنمية المنشآت
الصغيرة و الأصغر
Small & Micro Enterprise
Promotion Service



Transforming the Potato Sector in Yemen

Achieving Self-Sufficiency

GLOBAL SPUD: THE POTATO'S JOURNEY FROM THE ANDES TO YEMEN

It is believed that many years ago – over 7,000 years ago, the first potato was cultivated somewhere in Peru by the Inca civilization. Potato seeds later found their way to the rest of the globe. The crop itself has an attribution of its versatility, adaptability, and resilience, and has aided countless cultures to thrive economically, sustaining the livelihoods and food security of countless populations and shaping historical landscapes. The Spanish brought potatoes from the high Andes to the lowlands of Europe, where they enabled feeding the population, increasing agricultural production, and liberating labor for the Industrial Revolution.

Yet, the narration of how potato tubers paved their way from the Andes to the sun-drenched mountains and valleys of Yemen appears to be a gradual story where the influence was manifested by multiple actors. It's likely potatoes were introduced to Yemenis during the Turkish occupation in the nineteenth century. Later, the Egyptians introduced other varieties of potatoes in Yemen in the twentieth century. In the north, the Dutch influence was clear-cut, with precise records stating that the potatoes' growth was in 1977, establishing the first dedicated center for multiplying potato tubers. As for the South, the English, for their consumption, cultivated potatoes. From 1977 to the turn of the millennium, Yemen's potato cultivation witnessed remarkable growth, where a potato tuber is a substantial component of any Yemeni food table.



THE POTATO ADVANTAGE: WHY POTATOES THRIVE IN THE YEMENI AGRICULTURE

Farmers, globally, benefit from potatoes' advantageous agricultural characteristics. Potatoes are a profitable crop that can provide a reliable source of income. With their high yields and short growing seasons, farmers can have multiple harvests within a year, boosting their earning potential. Additionally, potatoes, unlike other crops, can be stored for extended periods, giving farmers more flexibility in selling their products. An additional advantage lies in potatoes' versatility which allows potatoes to be processed in many production processes. Not to forget, potatoes offer exceptional nutrient values compared with other staple crops, making potatoes a robust weapon to overcome food insecurity dilemmas.

Yemen's climate and agricultural potential also give the country a competitive advantage. This cold weather in the northern mountains of Yemen shapes potato cultivation practices, allowing farmers in Yemen to increase the number of harvests in a year and cultivate enough of the crop for local markets and consumption. In particular, the potato belt area, located in the governorates of Ibb, Amran, Dhamar, and Sana'a, is the most suitable area for producing potatoes, enabling crops to flourish, and free from disease-carrying insects.

UNVEILING THE OBSTACLES: SMEPS IDENTIFIES KEY ISSUES IN YEMENI POTATO PRODUCTION

The small and micro enterprises promotion services (SMEPS), focusing mainly on the development of micro, small, and medium (MSMEs) in vital sectors of the economy such as agriculture, selected the potato sector as one of the most important sectors of focus for livelihoods and food security. SMEPS worked on identifying the major issues affecting potato cultivation in Yemen. The technical team at SMEPS took a more analytical approach to find the sector's main obstacles, including water shortage, high irrigation and storage costs, and fuel prices. The team also analyzed farmers' technical skills, knowledge, and behaviors in the sector which impact their advancement in cultivating high-quality products at lower and competitive market prices. Some of the issues included using expensive methods of irrigation specifically flood irrigation with water pumping using fuel, and using the wrong types of seeds, fertilizers, and pesticides. Farmers also lacked the necessary skills in post-harvest practices resulting in poor product storage and also in the seed storage practices.

At the time of the analysis, SMEPS understood that one of the major issues impacting the sector was the imports of potato seeds where Yemen was importing 100% of local needs in potato seeds from Europe, which is around 6,000 tons of seeds yearly with a cost of \$9 million to produce 347377 tons of potatoes which is 20 tons per/ ha of seeds annually. Once the seeds were imported, local companies in Yemen used to multiply the imported seeds and then sell them to farmers or other companies working on multiplying the seeds in Yemen, which further increased the price of potato seeds and at times, impacted the quality for local farmers.



EMPOWERING YEMENI FARMERS: SMEPS BRIDGING THE GAPS IN POTATO PRODUCTION

Given SMEPS's experience in developing and promoting all sectors, including the agricultural industry, SMEPS decided to intervene in developing potato cultivation. In 2017, SMEPS attended a workshop held by the General Company for the Production of Potato Seeds to gain a deeper understanding from stakeholders on the main issues affecting the sector. The workshop focused on one of the main problems which was an increase in production costs for farmers including the seeds themselves SMEPS designed its strategy to support the sector, from the root problems facing farmers to the local production of potato seeds at high quality and lesser costs.

Step 1

The first step that SMEPS undertook was to work in coordination with the General Company for the Production of Potato Seeds to support smallholder farmers producing seeds in Dhamar and Amran. The idea was to change their behaviors hence enhancing their productivity and quality through capacity and skills development, behavioral changes in farming practices specifically in irrigation systems (from flood to drip), linking them with local markets and other stakeholders, conducting field days and demo fields to encourage replication and crowing in to increase local production of high-quality potato seeds. Furthermore, they were linked to specialized agricultural engineers to enhance their knowledge of crop rotation, quality, and others.

As a major outcome of this support, farmers' behavioral practices changed from using the old traditional ways of cultivation to utilizing more advanced cultivation methods which was obvious in the efficiency of water usage increasing productivity by 200.5% kg crop produced/cubic meter (from 3.20 to 9.61 kg potato produced/cubic meter). The results of the support in Dhamar were impressive showing a reduction of water consumption by 60% and fuel by almost 17 %. As for potato production, results showed a 30% increase in the cultivated potatoes – with high quality and free of all diseases which was around 16 tons/ha to 25 tons/ha. Furthermore, farmers reported an increase in profits by 24% in one season which greatly impacted livelihoods through improved incomes and living situations.

Step 2

SMEPS worked with a private sector-led tissue culture lab (Gharas Lab) to produce potato seeds. At the time, the lab was on the verge of closing and its owner was facing too many operational challenges. The support, as the owner mentioned in one of his interviews, came at the right time. It consisted of a matching grant support and infrastructure repair. It also included providing the lab with technical training and capacity building on business continuity planning and managing risks in a volatile setting. Being part of this support helped the lab to get back on its feet, and resume work with high motivation and vision. Furthermore, one of the challenges of the lab was its ability to link with local markets, so SMEPS initiated a linkage workshop in December 2019 between the laboratory and major producers (private sector and the General Company for the Production of Potato Seeds) to link the laboratory to the market and enable access to markets. Thus, the lab signed a partnership with the General Company for the Production of Potato Seeds – a public sector institution and the two institutions started working together toward a vision and strategy for the potato sector. This marked the beginning of a revolutionary partnership and a linkage that massively transformed the way the sector has developed.

This partnership helped to establish a new production line called the High-Grade Production Line in the lab. By August 2021, the laboratory and the company worked to produce three million first-generation tubers, free of viruses and with a high economic value. Under the full technical supervision of SMEPS, these first-generation tubers were planted in demo fields to obtain second-generation seeds (G2). As a result, the output of the G2 tubers reached and exceeded 40 tons per hectare compared to 20 tons earlier produced by G7 (7th generation) imported seeds.

In 2022, indicators of achieving self-sufficiency in potato seed production were closer than ever with both impressive quantitative and qualitative results in productivity, production, and quality. In 2024, after a period of focused endeavor, dedicated effort, and sustained investment from both public-private institutions **Yemen successfully achieved full self-sufficiency in potato seed production.** The Gharas Lab and the General Company for the Production of Potato Seeds are now leading the supply of locally produced and multiplied high-quality G2 potato tubers.

BEYOND YEMENI BORDERS: SMEPS SEEKS INNOVATION THROUGH INTERNATIONAL COLLABORATION

SMEPS continued coordination and communication to develop potato cultivation further and to seek international expertise in expanding and developing the sector towards a national strategy. SMEPS contacted the International Center for Potato (CIP) and organized a 14-day exposure visit for a specialized national team made up of SMEPS, the private sector, and academic institutions to the CIP regional office in Kenya. As an outcome, the team legally and officially was granted 28 varieties of potato seedlings (16 normal potatoes and 12 sweet potatoes). These varieties are characterized by their high production and resistance to diseases, heat, and drought. The team also received training in a technique for producing potato seedlings, which can replace tubers in production. One of the most important outcomes of the visit to Kenya was that SMEPS coordinated with the Gharas Lab to multiply the varieties the team obtained from Kenya using tissue technology.

The Gharas lab is currently working on field experiments in different weather conditions selecting Dhamar and Al-Hudaydah (hot areas where potatoes have never been grown) to test the new varieties and where initial results show most of the varieties growing with high quality and production even in hot areas. In addition, SMEPS supported the delivery of the multiplied varieties to Dhamar University, and in turn, the university offered some of the samples to the Agricultural Research and Extension Authority to carry out experiments with these varieties. Also, the varieties are now included in the master's programs for agriculture studies at Sana'a University.

Among the outcomes is that the Gharas Laboratory could apply the Apical rooted cutting seedling production technology which aims at producing seedlings as opposed to tubers which have a lower production cost in the initial stages of production i.e., do not require cold storage. In addition, using these seedlings will reduce the potato production period by saving the 30 days allocated for the tuber germination process. This will help to bring about a new radical change in the potato sector in Yemen.



WITNESSING THE TRANSFORMATION: SUCCESS IN THE SECTOR



When visiting some of the farmers in Dhamar recently, there were unbelievable gestures from the farmers who were happy and eager to share their achievements, saying “We are now ready to export potato seeds internationally”. Their smiles filled our hearts with joy and contentment. Farmers also expressed what they still need to take potato cultivation to the next level. Many of the farmers insisted on raising awareness among other farmers of modern irrigation systems and engaging more farmers, specifically in hotter areas in potato farming and in piloting the new varieties.

On the other hand, the General Company for the Production of Potato Seeds had made huge strides in the sector, recalling that the company was on the verge of a financial collapse in 2017 when they were desperate to conduct the workshop, seeking support. Now, they operate, with minimal financial support and resources, but with hope, ambition, and vision for a future where Yemen can stand out to be the only Arab country producing potato seeds locally, with high quality and competitive prices.

At SMEPS, we have seen the possibility of transforming a whole sector and engaging market players in the chain, from working on changing farming behaviors of small-scale farmers to bringing in technology and expertise in tissue culture and creating a very successful model of a public-private partnership that has transformed a whole sector. We continue our work in both the agricultural sector and others with a vision of enhancing local production and market access to high-quality locally produced products and services in vital sectors of the economy.



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