



STATUS AND PRODUCTION POTENTIAL OF OPIUM POPPY BASED ON A SWOT ANALYSES AND TOWS MATRIX

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INTRODUCTION

Opium poppy (*Papaver somniferum* L.) has a long tradition in Republic of North Macedonia and is internationally recognized for its high quality. According to the agricultural development plans from 1965, it was anticipated that the area under poppy cultivation would reach 7,500 ha, with a production of 65 tons of raw opium and 4,600 tons of seed (Gjorgjevski, 1964). The prohibition of capsule lancing as method for producing raw opium and the substitution of poppy with other agricultural crops were the main reasons for the drastic reduction in poppy cultivation areas. Therefore, cultivated areas have steadily declined, dropping to 35 hectares in 2022, with average capsule yields of 300 kg/ha and seed yields of 583 kg/ha.

MATERIALS AND METHODS

A SWOT matrix analyses was applied to the opium poppy production – that is, to its current status and the recommendation strategies. This is one of the most well-known and basic techniques of strategic analyses. With this procedure, the strengths and weaknesses were identified in a very efficient way as the opportunities and threats of opium poppy production. Based on an analyses of external and internal environmental factors, the TOWS matrix was developed with the aim of connecting all components and formulating a conceptual framework for the development of a strategy for opium poppy production (Certo and Certo, 2008, from: Ranogajec et al., 2024). The TOWS matrix enables the identification of connection between the strengths, weaknesses, opportunities, and the threats and provides a basis for the definition of strategies based on these relationships. It demonstrates how external opportunities and threats facing a particular production can be contrasted with the internal strengths and weaknesses to produce four alternative strategies:
SO strategies - use internal strengths to capitalize on external opportunities;
WO strategies – aim to address internal deficiencies by capitalizing on external opportunities;
ST strategies - use strengths to avoid or mitigate the effects of external threats;
WT strategies – defensive methods to mitigate internal flaws and prevent external dangers (Maity et al., 2023).
The data from harvest area (ha), average capsules yield (kg/ha), average seed yield (kg/ha), purchased poppy capsules (kg), and total seed production (t) for opium poppy production were taken from State Statistical Office from RN Macedonia and pharmaceutical company Alkaloid AD Skopje.

RESULTS AND DISCUSSION

The SWOT and TOWS analyses of opium poppy production in RN Macedonia

The internal factors of a SWOT matrix represent the strengths and weaknesses, while the opportunities and threats refer to the external factors that cannot be directly influenced, so sometimes they can only be adopted (Ranogajec et al., 2024) (Table 1).

Table 1. A SWOT analyses of opium poppy production in RN Macedonia

	Strengths	Weaknesses
	1. Long-standing tradition in opium poppy cultivation 2. Among the top three globally in morphine content 3. Reputable pharmaceutical company (Alkaloid AD) purchases the poppy product 4. Favorable climate and soil conditions 5. Existence of local varieties for propagation 6. Farmers’ knowledge of poppy cultivation 7. Subsidized production 8. Morphine cannot be synthetically produced (adds value to natural cultivation)	1. Small cultivated areas 2. Manual sowing and high seed rate 3. Manual harvesting 4. Low yields (capsules and seeds) 5. Low purchase price for capsules and seeds 6. Limited interest from pharmaceutical industry in expanding production 7. No possibility for capsule export 8. Extensive agronomic practices (low input, outdated techniques) 9. Lack of stable seed purchasing/processing industry
	Opportunities	Threats
	1. Potential for seed export 2. Oil production from poppy seed 3. Development of small-scale processing units for oil 4. International cooperation with foreign companies for production and research 5. Cultivation as a spring crop	1. Risk of misuse of the crop 2. Farmer reluctance to cultivate a controversial plant 3. Market instability 4. Abandonment of agricultural land 5. Aging farmer population

Strengths/Weaknesses/Opportunities/Threats

RN Macedonia has a long tradition in opium poppy cultivation, known for producing some of the world’s highest-quality poppies with exceptional morphine content. A domestic pharmaceutical company provides a stable market, while favorable climate, local varieties, skilled farmers, and government subsidies further support production. Natural morphine remains relevant since synthetic production is not yet established. However, the sector faces major constraints: cultivation is limited to small areas, with inefficient manual sowing and harvesting leading to low yields and high labor costs. Prices for capsules and seeds are unattractive, export of capsules is restricted, and the main buyer shows little interest in expansion. Poor agronomic practices, lack of irrigation, and absence of a stable seed-processing industry weaken the value chain. Opportunities include seed export, local oil production, small-scale processing, international research partnerships, and shifting to spring cultivation to ease planting schedules. Key threats involve risk of misuse, social stigma, market instability, land abandonment, and an aging farming population, all undermining long-term sustainability.

Based on a SWOT analyses a TOWS matrix was developed, in which the components were connected according to the four possible strategies (Table 2):

Table 2. A TOWS matrix of opium poppy production in RN Macedonia

	Opportunities (O)	Threats (T)
Strengths (S)	S- O Strategies: Use strengths to take advantage of opportunities - Promote North Macedonia’s high-quality poppy and morphine content, expand the seed export and attract foreign partners (S2, O1, O4) - Utilize farmers’ experience and favorable conditions to expand oil production and local processing (S4, S6, O2, O3)	S - T Strategies: Use strengths to minimize threats - Use strong pharmaceutical partnerships and tradition to stabilize markets and address regulatory concerns (S1, S3, T1, T3) - Leverage subsidies and existing infrastructure to retain younger farmers and reduce land abandonment (S7, T4, T5)
Weaknesses (W)	W - O Strategies: Minimize weaknesses by taking advantage of opportunities - Introduce mechanization and modern agronomy through international cooperation (W2, W3, W8, O4) - Develop small processing units to improve profitability and reduce low purchase price impact (W5, W9, O2, O3)	W - T Strategies: Minimize weaknesses and avoid threats - Address farmer reluctance through education, demonstration plots, and improved profitability (W5, W6, T2, T5) - Create export channels for seed to reduce overdependence on local pharma and manage market instability (W6, W7, T3)

According TOWS matrix, by aligning internal strengths with external opportunities, several proactive strategies emerge, such as leveraging the country's high morphine content and cultivation tradition to expand seed exports, attract international research partnerships, and promote small-scale oil processing units. Equally important are the defensive strategies, which aim to use existing strengths to mitigate threats. These include countering farmer reluctance and market instability through institutional support, better contracting models, and regulated supply chains emphasizing the value of natural morphine. Addressing weaknesses through opportunities is a key part of the matrix, particularly by focusing on improving yields, reducing manual labor, and diversifying market outlets through export and value-added processing. Furthermore, minimizing weaknesses while responding to threats is critical for long-term sustainability. This includes combating low profitability and an aging farmer population with modernization efforts and incentive schemes. Building on these insights, several steps are proposed:
- develop a national strategy for poppy revitalization between the Ministry of Agriculture, Forestry and Water Economy, Ministry of Health, and private stakeholders to set clear targets for expanding cultivation,
- improving value chains, and enabling safe and legal export; support research and breeding programs to increase yield, disease resistance, and adaptability;
- modernize production techniques through training and subsidized equipment; and educate younger generations of farmers to secure long-term adoption.
Overall, the TOWS matrix highlights that with targeted investment, regulatory clarity, and market diversification, opium poppy can evolve from a traditional crop into a modern, niche agricultural sector with both economic and scientific value for RN Macedonia.

CONCLUSIONS

The SWOT and TOWS analyses clearly show that Republic of North Macedonia possesses a strong foundation for revitalizing its opium poppy sector, built on tradition, proven quality (in terms of morphine content), and supportive infrastructure. However, outdated practices, low profitability, and an aging farming population threaten its long-term viability. By strategically combining internal strengths with emerging opportunities such as seed export, small-scale processing, and international cooperation, the sector can move toward modernization and sustainable growth. At the same time, defensive measures are required to address farmer reluctance, market instability, and regulatory concerns. A coordinated national strategy that integrates government institutions, research programs, and private stakeholders is essential. This strategy should focus on mechanization, improved agronomy, training for younger farmers, and the creation of new value chains for seeds and oil products. With targeted investment, clear regulations, and stronger market diversification, opium poppy production can transition from a shrinking traditional crop into a competitive, high-value niche sector, providing both economic benefits and scientific opportunities for the country.

References:

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