



Organic Fertilizer in Medicinal and Aromatic Plant Production: SWOT Analysis and Strategies

Tıbbi ve Aromatik Bitki Üretiminde Organik Gübre: GZFT Analizi ve Stratejileri

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Öz

Tıbbi ve aromatik bitkiler gıda, ilaç, kozmetik, ve baharat gibi amaçlar için yüzyıllardır kullanılmaktadır. Artan insan ve çevre sağlığı problemlerinden dolayı da her geçen gün organik ürünlere ilgi artmaktadır. Organik gübre kullanımı ürün kalitesini artırma haricinde toprağı iyileştirme ve atığı değerlendirmeyi de sağlar. Çalışmanın amacı, tıbbi ve aromatik bitki üretiminde organik gübre kullanımının SWOT analizini gerçekleştirmek ve stratejiler belirlemektir. Gerçekleştirilen SWOT analizinde güçlü yönler ve fırsatların zayıf yönler ve tehditlere kıyasla çok olduğu görülmüştür. Stratejiler (SO, ST, SW, WO, WT, WT, OT) belirlenmiştir. Zayıf yönler ve tehditler devlet teşviki, eğitim ile azaltılabilir. En dikkate değer zayıf yön, organik gübre kullanımının verimin az olmasına neden olmasıdır. Sadece verim bazlı değil kalite bazlı ürün üretme amacını edinen biri kimyasal gübre yerine organik gübre kullanılmalıdır. Organik gübre sağlıklı, kaliteli ürün üretmeyi sağlar, toprağın fiziksel, kimyasal ve biyolojik özelliklerini iyileştirir ve organik içerikli atıklardan üretilmesi halinde de çevre kirliliğini ve yönetilmesi gereken atık miktarını azaltır. Devlet, insan ve çevre sağlığını korumak ve iç/dış pazarların artmasını sağlamak için organik gübre kullanımını daha fazla teşvik etmelidir. Organik gübrenin etkin üretimi ve kullanımı için üreticiye eğitim verilmelidir.

Anahtar Kelimeler: Tıbbi ve aromatik bitki, organik gübre, GZFT analiz, strateji.

Abstract

Medicinal and aromatic plants have been used for centuries for food, medicine, cosmetics, and spices. Due to increasing human and environmental health problems, interest in organic products is increasing day by day. The use of organic fertilizers not only improves crop quality but also improves soil and utilizes waste. The aim of the study is to conduct a SWOT analysis of the use of organic fertilizers in medicinal and aromatic plant production and to identify strategies. The SWOT analysis showed that strengths and opportunities outnumbered weaknesses and threats. Strategies (SO, ST, SW, WO, WT, WT, OT) were identified. Weaknesses and threats can be reduced by government

incentives and training. The most notable weakness is that the use of organic fertilizers leads to low yields. Someone who aims to produce not only yield-based but also quality-based products should use organic fertilizers instead of chemical fertilizers. Organic fertilizer produces healthy, quality crops, improves the physical, chemical and biological properties of the soil and, if produced from organic waste, reduces environmental pollution and the amount of waste to be managed. The state should further promote the use of organic fertilizer to protect human and environmental health and to increase domestic/foreign markets. Producers should be trained in the effective production and use of organic fertilizer.

Keywords: Medicinal and aromatic plant, organic fertilizer, SWOT analysis, strategy.

INTRODUCTION

Medicinal and aromatic plants (MAPs) are used for food, medicine, cosmetics, and spices. MAPs are either collected from nature or grown under favorable ecological conditions. Although MAPs have been used since ancient times, interest is increasing day by day due to increasing health problems. Türkiye is a country rich in MAPs in terms of climate. All regions of Türkiye (especially Aegean, Marmara, Mediterranean, Eastern Black Sea and Southeastern Anatolia) produce MAPs. Quality is as important as yield in MAP production (Yaldız et al. 2019).

Interest in organic agriculture is increasing due to increasing health and environmental awareness. For this reason, organic fertilizers should be preferred in MAP production considering their intended use. By using organic fertilizers, organic production is realized, environmental pollution is reduced and soil quality is improved. For this reason, it is extremely important to use organic fertilizers instead of inorganic (chemical) fertilizers in MAP production. Organic fertilizer can be produced from animal and plant wastes and biosolids (Anonymous1, 2010). Many studies (Succop and Newman, 2004; Kocabaş et al., 2007; Aboutalebi et al. 2013; Yaldız et al. 2017; Yüksek et al., 2020; Farrokhi et al., 2021; Rahimi et al., 2023; Askary et al., 2023) have been conducted on the use of organic fertilizers in MAP production. In the study where thyme was grown using different organic fertilizers (vermicompost, compost, animal manure), it was stated that vermicompost was an effective fertilizer (Rahimi et al., 2023). In most of the studies, it has recommended the use of inorganic and organic fertilizers together. The reason for this is to obtain the desired yield. Because it has been stated that the desired yield cannot be obtained only with the use of organic fertilizers. SWOT analysis studies on organic agriculture are limited (Tashi and



Wangchuk 2016; Mioldayzs et al. 2016; Merdan 2018; Srednicka-Tober et al., 2018). Mioldayzs et al. (2016) conducted a SWOT analysis of animal manure and plant residues. The SWOT analysis indicated that wastes of animal origin are more suitable for fertilizer production than wastes of plant origin.

The aim of this study is to give information about MAP and organic fertilizer, to examine studies on the use of organic fertilizer in MAP production, to conduct a SWOT analysis and to propose strategies for the use of organic fertilizer in MAP production.

MAP IN TURKIYE AND ORGANIC FERTILIZER

Organic plant production in Turkiye is 1101236.97 tons. 216863.10 ha of which is produced and 24334.03 ha of which is collected from nature. Carob, rose hips, chamomile, chamomile, mint, wild herbs, laurel, melissa, centaury and nettles are generally collected from nature. Carob (3724 tons), laurel (1227 tons), rose (902 tons), poppy (514 tons), capers (438 tons), black cumin (321 tons), fennel (277 tons), cumin (268 tons), blueberries (241 tons), lavender (155 tons), anise (113 tons), gilaburu (78.5 tons), tarragon (72 tons), coral root (22 tons), melissa/sonica (17 tons), cress (14.5 tons), mint (8.3 tons) centaury (7 tons), basil (6.25 tons), lemon balm (4.5 tons), wolfberry/goji berry (4, 5 tons), coriander (4.5 tons), sorrel (3.5 tons), chamomile (3.5 tons), echinacea (1 ton), and zahterin (0.5 tons) (TOB, 2022). Antalya, Aydın, İzmir, Mersin and Kocaeli rank first in terms of plant diversity (KIRICI, 2015). Interest in good agriculture has also increased day by day. In 2007, good agriculture was practiced in 18 provinces and in 2021 in 63 provinces. The production amount is around 6612544 tons (TOB, 2022).

Organic fertilizers can be divided into 5 groups: barn-poultry manure, compost, vermicompost, biological fertilization (application of mycorrhizal fungi and bacteria) and green manuring. Organic fertilizers improve the physical, chemical and biological properties of the soil (Bachman and Metzger, 2008) and are a product that enables organic farming (only organic fertilizers are used) or good agriculture (minimal pesticides and chemical fertilizers are allowed). Organic fertilizers can have different contents depending on the source. The properties of some heavy animal manures are given in Table 1. The number of cattle, buffalo, sheep, and goats is approximately 17 million, 172 thousand, 45 million, and 12 thousand, respectively. The

number of chicken, turkey, duck and goose poultry is approximately 361 thousand, 4 thousand, 432 thousand, and 1400 respectively (TUIK, 2022).

Genus	H ₂ O (%)	Dry Matter (%)	N (%)	P ₂ O ₅ (%)	K ₂ O (%)	CaO (%)
Cattle	83.2	16.2	0.29	0.17	0.10	0.34
Horse	75.7	24.3	0.44	0.35	0.35	0.15
Sheep	65.5	34.8	0.55	0.31	0.15	0.46
Goose, Duck	75.0	25.0	0.80	1.00	0.80	1.30
Pigeon, Chicken	62.0	38.0	1.70	1.60	0.90	2.00

Table 1. *Properties of Barn Animal Manures (Yaldız et al., 2019; Anonymous1, 2010)*

Compost is a method used to obtain fertilizer from organic wastes. All wastes can be composted except inorganics (plastic, glass, metal, etc.) and organics (coal ash, medicines, medical waste, plants with pesticides, etc.) containing harmful and hazardous substances. Producing fertilizer with compost provides both waste minimization and the fertilizer produced improves some properties of the soil (Anonymous2, 2023). Vermicompost is produced by digestion of organic wastes by some earthworms (Şimşek-Erşahin, 2007). Some fungi and bacteria are used in biological fertilization (Yaldız et al., 2019). Green manuring is also preferred especially in regions where animal wastes are limited. The plants used as green manure are legumes (clover, meadow clover, stone clover, soybean, fodder pea, fodder cowpea, red clover, hairy vetch, Hungarian vetch, hairy fruiting vetch, big vetch, common vetch, pea, damson, lupine, lupine, Alexandrian trifle, white clover), cereals (rye, oats, barley, millet, wheat, grass, sudan grass, silage corn) and other families (mustard, rape, radish, poppy, safflower, turnip) (Karakurt, 2009).

SWOT ANALYSIS AND STRATEGIES FOR THE USE OF ORGANIC FERTILIZER IN MAP PRODUCTION

Strategy is a process involving planning and management to achieve goals (Karatop, 2015). SWOT analysis is a preferred technique for planning the future. It is widely used (Houben et al., 1999; Kherirkhah et al. 2009; Şevkli et al. 2012; Ağır and Karatop, 2022). With SWOT analysis, the current situation is analyzed in terms of Strengths (S), Weaknesses (W), Opportunities (O) and Threats (T) and planning and strategizing for the future can



be easily done. While S and W are controllable, O and T are not controllable (Ağır and Karatop, 2022). SWOT analysis was conducted for the use of organic fertilizers in MAP production and is given in Table 2.

Strengths	Weaknesses
Having different fertilizer alternatives	Inadequate/unconscious use of information-training
Knowledge and experience on the use of traditional fertilizers	Use of medicines for the prevention of animal-plant diseases
Providing employment opportunities	Use of chemical fertilizers to increase production
Reducing environmental pollution	Low productivity
Not difficult to produce	Insufficient level of knowledge - overuse, lack of fertilizer production, etc.
Ensuring the production of healthy-quality (organic) products	Lack of necessary analysis of organic fertilizers, soil and products
Increased interest in organic products	Lack of accredited laboratories for analysis
Reduced fertilizer costs	High analysis fee
Increasing soil fertility	Deficiencies in separation and management of waste at source
Ensuring sustainable agriculture	Not using appropriate methods, times and quantities
High-priced markets	Lack of policy (incentives, support, etc.)
Increased government incentives	Lack of coordination between different institutions
Increased environmental awareness	Limited technical expertise
Opportunities	Threats
Increased interest in organic farming	External dependence in terms of technology, inputs and energy
Organic products are expensive	Global climate change
Continuously increasing demand for organic products	Environmental pollution
Having domestic and foreign markets	Increasing population and consumption
Increasing interest in healthy products due to diseases such as COVID, cancer	Attractiveness of chemical drugs/hormones and modern techniques
Increased environmental awareness	High global competition
Variability and increase of diseases	High incidence of disease
Protection of local crops	High cost of certification
Sustainable use of resources	
Strengthening rural communities	

Table 2. SWOT Analysis of Organic Fertilizer in MAP Production (Şimşek-Erşahin, 2007; Tashi and Wangchuk 2016; Mielayzs et al., 2016; Merdan, 2018; Srednicka-Tober et al.,, 2018; Yaldız et al., 2019)

Table 2 shows that the use of organic fertilizers in MAP production provides various advantages and opportunities. It can also be said that the use

of organic fertilizer positively affects environmental factors. In the SWOT analysis, “Opportunities” seems to be numerically superior. Although the strengths and weaknesses are almost equal, it is seen that it has many advantages in general.

SWOT analysis strategy is used to avoid being affected by negativities or to turn negativities into positives by using positive aspects (Ağır and Karatop, 2022). In other words, strengths and opportunities and weaknesses and threats are eliminated or reduced. Thus, strengths are strengthened and opportunities are increased. In SWOT analysis, more focus is placed on opportunities. The most emphasized weaknesses are the preference for chemical fertilizers to obtain high yields and the lack of education/awareness. The most emphasized opportunity is the consideration of human and environmental health. Merdan (2018) conducted a SWOT analysis of organic agriculture in Türkiye and stated that weaknesses are more predominant and new opportunities have emerged due to changes in organic agriculture. In the current study, it is possible to say that strengths and weaknesses have almost the same weight. The most important reason for this may be that only the use of organic fertilizer (not commercial organic fertilizer, but fertilizer produced from organic wastes) in MAP production was taken into consideration in this study. Some strategies were developed considering the SWOT analysis. The strategies are given in Table 3.



SO Strategies	ST Strategies
<ul style="list-style-type: none"> ✓ Increase competitors to reduce the high cost of organic products and increase government incentives to do so ✓ The fact that organic fertilizer production is not difficult may increase the demand for organic products ✓ By using organic fertilizers, soil fertility can be improved and resources can be used sustainably 	<ul style="list-style-type: none"> ✓ Increased environmental awareness can reduce the negative effects of environmental pollution ✓ Increased interest in organic products may reduce the use of chemical pesticides and fertilizers ✓ High-priced markets may lead to prioritizing quality over efficiency
WO Strategies	WT Strategies
<ul style="list-style-type: none"> ✓ Raising consumer awareness can further increase interest in healthy, quality products ✓ Increase competitors to reduce the high cost of organic products and increase government incentives to do so 	<ul style="list-style-type: none"> ✓ Low productivity can reduce willingness to produce quality products ✓ Use of pesticides to prevent animal and plant diseases can increase environmental pollution ✓ Global climate change could reduce organic production yields
SW Strategies	OT Strategies
<ul style="list-style-type: none"> ✓ Increased environmental awareness can reduce the use of chemical fertilizers ✓ With increasing environmental awareness and reducing environmental pollution, wastes can be used as fertilizer ✓ Use chemical fertilizers to increase production and use different organic fertilizer alternatives to reduce the cost of fertilizers 	<ul style="list-style-type: none"> ✓ Crop yields can be increased by improving soil fertility ✓ Reduce the use of chemical drugs/hormones due to the variability and increase of diseases ✓ Increased environmental awareness can reduce the negative effects of environmental pollution.

Table 3. SWOT Strategies of Organic Fertilizer Use in MAP Production

If one aims to produce not only yield-based but also quality-based products, one should use organic fertilizers instead of chemical fertilizers. The government should further promote the use of organic agriculture (i.e. organic fertilizers) to improve human and environmental health and increase domestic/foreign markets. Producers should be trained for effective production and use of organic fertilizers.

Conclusion

Due to increasing health and environmental problems, it is of great importance to consume organic products. MAPs, which have been used for centuries, are especially consumed as health and food. Due to increasing health and environmental problems, interest in organic fertilizers is increasing day by day. For this reason, the use of organic fertilizers should be preferred instead of chemical fertilizers used to obtain more yield. The use of organic fertilizers in MAP production has several strengths and opportu-

nitities. Weaknesses and threats can be reduced with government incentives and education. The most notable weakness is that the use of organic fertilizer leads to low yields. On the other hand, organic fertilizer improves the physical, chemical and biological properties of the soil as well as producing healthy, high quality crops. Moreover, if organic fertilizer is produced from organic waste, it reduces environmental pollution and the amount of waste to be managed. In short, organic fertilizer should be preferred in MAP production for both human and environmental (especially soil) health.

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The entire study was performed by the corresponding author.

Conflict of Interest

No conflict of interest is reported by the author(s).

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Ethical Statement

Ethics committee permission is not required for the study.