THE ROLE OF ORGANIC FERTILIZERS IN SUSTAINABLE OKRA CULTIVATION UNDER THE CLIMATIC CONDITIONS OF UZBEKISTAN

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Annotatsiya

O‘zbekistonda iqlim o‘zgarishi, tuproq degradatsiyasi va ekologik jihatdan xavfsiz qishloq xo‘jaligi mahsulotlariga bo‘lgan talabning ortib borishi sababli barqaror sabzavotchilik ishlab chiqarishi tobora muhim ahamiyat kasb etmoqda. Bamiya (okra) o‘zining ozuqaviy qiymati, qurg‘oqchilikka chidamliligi va iqtisodiy salohiyati tufayli istiqbolli sabzavot ekinlaridan biri hisoblanadi. Biroq mineral o‘g‘itlardan haddan tashqari foydalanish tuproq unumdorligiga va atrof-muhit barqarorligiga salbiy ta’sir ko‘rsatishi mumkin. Mazkur tadqiqot O‘zbekistonning iqlim sharoitida bamiya yetishtirishda organik o‘g‘itlarning o‘simliklarning o‘sishi, hosildorligi va ishlab chiqarish barqarorligini oshirishdagi rolini o‘rganadi. Tadqiqotda sabzavotchilikda ekologik jihatdan barqaror muqobil vositalar sifatida go‘ng, kompost va bioo‘g‘itlar kabi organik o‘g‘itlardan foydalanishga e’tibor qaratilgan. Shuningdek, organik o‘g‘itlarning tuproq tuzilishi, namlikni saqlash qobiliyati, o‘simliklarning o‘sishi va ekin hosildorligiga ta’siri ko‘rib chiqiladi. Tadqiqot natijalari organik o‘g‘itlar tuproq unumdorligini yaxshilash, uning suvni ushlab turish qobiliyatini oshirish va o‘simliklarning rivojlanishini rag‘batlantirish bilan birga, kimyoviy o‘g‘itlardan foydalanish bilan bog‘liq ekologik bosimni kamaytirishga yordam berishini ko‘rsatadi. Shu bilan birga, organik materiallarning cheklanganligi, fermerlarning xabardorlik darajasining yetarli emasligi va qishloq xo‘jaligini boshqarish amaliyotlarini takomillashtirish zarurati kabi qator muammolar mavjud. Tadqiqot xulosasiga ko‘ra, organik o‘g‘itlardan kengroq foydalanish O‘zbekistonda barqaror qishloq xo‘jaligini rivojlantirish, atrof-muhitni muhofaza qilish va oziq-ovqat xavfsizligini ta’minlashga xizmat qilishi mumkin.

Kalit so‘zlar: bamiya (okra), organik o‘g‘itlar, barqaror qishloq xo‘jaligi, tuproq unumdorligi, O‘zbekiston.

Аннотация

Устойчивое производство овощей приобретает всё большее значение в Узбекистане в связи с изменением климата, деградацией почв и растущим спросом на экологически безопасную сельскохозяйственную продукцию. Бамия (окра) является перспективной овощной культурой благодаря своей пищевой ценности, засухоустойчивости и экономическому потенциалу. Однако чрезмерное использование минеральных удобрений может негативно влиять на плодородие почвы и экологическую устойчивость сельскохозяйственного производства. В данном исследовании рассматривается роль органических удобрений в улучшении роста растений, урожайности и устойчивости производства бамии в климатических условиях Узбекистана. Особое внимание уделяется применению таких органических удобрений, как навоз, компост и биоудобрения, в качестве экологически устойчивой альтернативы при производстве овощей. В исследовании рассматривается влияние органических удобрений на структуру почвы, её способность удерживать влагу, рост растений и урожайность культуры. Результаты показывают, что органические удобрения способствуют повышению плодородия почвы, увеличению её

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водоудерживающей способности и улучшению развития растений, одновременно снижая экологическую нагрузку, связанную с использованием химических удобрений. Вместе с тем сохраняется ряд проблем, включая ограниченную доступность органических материалов, недостаточную осведомлённость фермеров и необходимость совершенствования методов управления сельскохозяйственным производством. В исследовании делается вывод о том, что более широкое применение органических удобрений может способствовать развитию устойчивого сельского хозяйства, охране окружающей среды и обеспечению продовольственной безопасности в Узбекистане.

Ключевые слова: бамия (окра), органические удобрения, устойчивое сельское хозяйство, плодородие почвы, Узбекистан.

Abstract

Sustainable vegetable production has become increasingly important in Uzbekistan due to climate change, soil degradation, and the growing demand for environmentally friendly agricultural products. Okra is considered a valuable vegetable crop because of its nutritional value, drought tolerance, and economic potential. However, excessive use of mineral fertilizers may negatively affect soil fertility and environmental sustainability. This study examines the role of organic fertilizers in improving the growth, productivity, and sustainability of okra cultivation under the climatic conditions of Uzbekistan. The paper focuses on the application of organic fertilizers such as farmyard manure, compost, and biofertilizers as environmentally sustainable alternatives for vegetable production. The study discusses the influence of organic fertilizers on soil structure, moisture retention, plant growth, and crop yield. The findings indicate that organic fertilizers contribute to improved soil fertility, increased water-holding capacity, and enhanced plant development while reducing environmental pressure associated with chemical fertilizers. At the same time, several challenges remain, including limited availability of organic materials, insufficient farmer awareness, and the need for improved agricultural management practices. The study concludes that the wider adoption of organic fertilizers can support sustainable agriculture, environmental protection, and food security in Uzbekistan.

Keywords: okra, organic fertilizers, sustainable agriculture, soil fertility, Uzbekistan

Introduction

Agriculture remains one of the key sectors of the economy in Uzbekistan and plays an important role in ensuring food security and rural development. In recent years, increasing attention has been given to sustainable agricultural production due to environmental challenges such as soil degradation, water scarcity, and climate change. Vegetable crops are particularly important for improving nutritional security and supporting agricultural diversification in the country.

Okra (Abelmoschus esculentus L.) is a warm-season vegetable crop that is widely cultivated in tropical and subtropical regions. The crop is valued for its nutritional composition, drought tolerance, and adaptability to different climatic conditions. In Uzbekistan, okra cultivation has gained increasing interest because of its economic value and growing demand in local and international markets.

Fertilizer management is one of the most important factors affecting crop productivity and soil quality. Excessive application of chemical fertilizers may lead to soil degradation, environmental pollution, and declining soil fertility over time. Therefore, the use of organic fertilizers has become an important component of sustainable agricultural practices. Organic fertilizers improve soil structure, increase microbial activity, and enhance the soil's capacity to retain moisture and nutrients.

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This paper examines the importance of organic fertilizers in sustainable okra cultivation and discusses their role in improving plant growth, soil fertility, and environmental sustainability under the climatic conditions of Uzbekistan.

Discussion of results

Organic fertilizers play a significant role in improving soil quality and supporting sustainable vegetable production. Farmyard manure and compost are among the most used organic fertilizers in agricultural production. These materials increase organic matter content in the soil and improve soil structure, which enhances water infiltration and nutrient availability for plants.

One of the major advantages of organic fertilizers in okra cultivation is their positive effect on soil moisture retention. Under the arid and semi-arid climatic conditions of Uzbekistan, maintaining soil moisture is essential for stable crop growth and productivity. Organic matter helps reduce evaporation losses and improves the soil's water-holding capacity, which is especially important during periods of drought and high temperatures.

The application of organic fertilizers also contributes to improved plant growth and crop development. Nutrients released gradually from organic materials support root development, leaf formation, and fruit production in okra plants. In addition, organic fertilizers promote beneficial microbial activity in the soil, which improves nutrient cycling and overall soil health.

Biofertilizers and compost-based fertilizers are increasingly considered environmentally sustainable alternatives to chemical fertilizers. Their use reduces dependence on synthetic agricultural inputs and decreases the risk of soil and water contamination. Sustainable fertilizer management therefore contributes not only to agricultural productivity but also to environmental protection and long-term soil conservation.

Despite these advantages, several factors continue to limit the widespread use of organic fertilizers in Uzbekistan. Limited availability of high-quality organic materials, insufficient technical knowledge among farmers, and labor-intensive application methods remain important challenges. In some cases, farmers prefer mineral fertilizers because of their faster visible effects on crop growth.

Government support, farmer training programs, and agricultural extension services are important for encouraging the adoption of sustainable fertilizer management practices. Increasing awareness of the environmental and economic benefits of organic fertilizers may further support the development of sustainable vegetable production systems in Uzbekistan.

Main conclusions

This study examined the role of organic fertilizers in sustainable okra cultivation under the climatic conditions of Uzbekistan. The findings demonstrate that organic fertilizers contribute significantly to improving soil fertility, maintaining soil moisture, and supporting healthy plant growth.

Farmyard manure, compost, and biofertilizers improve soil structure and enhance nutrient availability, which positively affects okra productivity and environmental sustainability. Organic fertilizers also reduce the environmental risks associated with excessive chemical fertilizer use and support long-term soil conservation.

At the same time, the successful implementation of organic fertilizer systems depends on several economic and institutional factors, including access to organic materials, farmer awareness, and agricultural support services. Expanding sustainable farming education and improving access to organic agricultural inputs can further encourage environmentally friendly vegetable production.

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In conclusion, the use of organic fertilizers offers practical opportunities for developing sustainable okra cultivation in Uzbekistan. The integration of environmentally friendly fertilizer management practices can contribute to agricultural sustainability, environmental protection, and food security under changing climatic conditions.

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