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Castor as a Dual Crop: A Sustainable Approach for Oilseed Production and Eri Sericulture

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Modern agriculture is increasingly focusing on crops that provide multiple benefits to farmers in terms of income, sustainability, and resource utilization. Castor (*Ricinus communis* L.) is one such crop that serves as a dual-purpose plant by providing leaves for eri silkworm rearing and seeds for oil production. Castor is the primary host plant of the eri silkworm (*Samia ricini*), and its leaf quality significantly influences larval growth and cocoon production. At the same time, castor seeds have high industrial value due to their oil content. The integration of castor cultivation with eri sericulture offers opportunities for income diversification, employment generation, and sustainable farming. This article discusses the importance of castor as a dual crop, its agronomic and economic advantages, environmental benefits, challenges, and future prospects. Promoting castor in integrated farming systems can strengthen the sericulture sector and improve farmer livelihoods.

Keywords: Castor, *Ricinus communis*, Eri silkworm, Dual crop, Sericulture, Oilseed crop, Sustainable farming

Introduction

In order to guarantee farmers' financial security, agricultural diversification has become crucial. Multipurpose crops are becoming more and more important since they lower the hazards of relying solely on one crop. One such adaptable crop that is crucial to both agriculture and sericulture is castor (*Ricinus communis* L.). Castor is known for its industrial significance and is frequently grown as a non-edible oilseed crop. In addition, it serves as the primary host plant for the eri silkworm (*Samia ricini*), which yields eri silk, one of India's main non-mulberry silks. Castor is appropriately referred to as a dual crop since it produces both leaf biomass for silkworm raising and seeds for oil extraction. The concept of castor as a dual crop is particularly important for small and marginal farmers because it allows them to obtain returns from two different enterprises from the same land. This integration supports sustainable agriculture and promotes efficient use of natural resources.

Castor as an important oilseed crop

Castor is an economically important industrial crop cultivated in tropical and subtropical regions. Castor oil has several industrial uses, including lubricants, paints, cosmetics, medicines, and bioproducts. India is one of the top producers of castor seeds. The crop's ability to adapt to many environmental conditions makes it valuable. Castor can be cultivated on marginal soil where other crops might not do well and can withstand drought conditions. Because of these features, it can be used by farmers with limited resources. Additionally, the crop may be grown using relatively straightforward management techniques and only

requires modest inputs. Farmers can get a high seed output and enough leaf production for silkworm feeding with the right agronomic practices.

Role of castor in eri sericulture

An essential part of non-mulberry sericulture is eri culture. Despite being polyphagous, the eri silkworm exhibits a great a tendency for castor leaves because of their nutritional value. According to studies, eri silkworms fed castor leaves exhibit superior cocoon qualities, development, and survival when compared to other host plants. Larval growth and silk yield are significantly influenced by the nutritional value of castor leaves. Economic characteristics including larval weight, cocoon weight, and shell ratio are influenced by the quality of the host plant. The protein and carbohydrate composition of eri silkworms is influenced by host plants such as castor, which indirectly affects silk production, according to recent biochemical investigations. Castor is therefore a crucial component that determines the success of eri sericulture in addition to being a host plant.

Concept of castor as a dual crop

Castor qualifies as a dual crop because it produces two valuable outputs:

- **Leaves for eri silkworm**
- **Seeds for castor oil production**

Farmers have a variety of revenue options because to this dual role. If crop management is done correctly, harvesting leaves on a regular basis won't have a major impact on seed yield. At the end of the agricultural season, seed harvesting guarantees extra revenue. This technique lowers financial risks and increases farm profitability. The other business can sustain farmer revenue in the event that one fails due to market or environmental issues.

Agronomic advantages of castor as a dual crop

When used into sericulture systems, castor provides a number of agronomic benefits that improve sustainability and productivity. Its cultivation maximises land productivity by allowing farmers to produce castor and support silkworm rearing operations at the same time. The crop guarantees a consistent supply of leaves for several cycles of silkworm rearing. Additionally, intercropping castor with millets and pulses promotes sustainable and diverse planting systems. While the by-product castor oil cake acts as an organic fertiliser, enhancing soil fertility and promoting environmentally friendly farming practices, its flexibility to different soil types and climatic conditions makes it practical across numerous locations.

Economic benefits

Castor as a dual crop offers multiple income streams

- Sale of castor seeds
- Income from castor oil processing
- Eri cocoon production
- Sale of eri pupae for value addition
- Use of oil cake as manure

Research shows that eri silkworm performance improves significantly when fed on good quality castor leaves, resulting in better cocoon yield and economic returns. This integrated approach strengthens rural livelihoods and supports small-scale enterprises related to sericulture and oil processing.

Environmental benefits

As a dual crop, castor has significant environmental advantages that promote sustainable agriculture. Its deep root system improves soil health overall by strengthening soil structure, lowering erosion, and supplying organic matter through crop leftovers. The crop offers resistance in the face of climate change since it is comparatively drought-tolerant. Composting unused leaves and other residues can help with efficient waste recycling. Additionally, using environmentally friendly pest and disease control techniques in castor

helps preserve leaf quality, guaranteeing eri silkworms safe and nourishing nutrition while encouraging ecologically conscious farming.

Scientific support for castor as a dual crop

The dual significance of castor in agriculture and sericulture is supported by scientific research. Because of its advantageous nutritional profile and ability to enhance larval growth and cocoon qualities, research has shown that castor is the favoured host plant for eri silkworms. The production and feeding efficiency of silkworms can be enhanced by choosing appropriate castor cultivars, according to experimental research on several cultivars. The significance of encouraging castor cultivation in eri sericulture regions is emphasised by these findings.

Challenges in adopting castor as a dual crop

Despite its advantages, some limitations must be considered.

Pest and disease incidence

Castor is affected by pests and diseases that may reduce leaf yield and quality.

Competition between leaf and seed production

Improper leaf harvesting may affect seed yield if not managed properly.

Market price fluctuations

Castor seed prices may vary depending on industrial demand.

Lack of awareness

Many farmers are still unaware of the dual benefits of castor.

Limited improved varieties

There is a need for varieties specifically developed for dual purposes.

Addressing these constraints through extension education and research support can improve adoption.

Limitations

Some limitations associated with castor as a dual crop include:

- Need for balanced nutrient management to support both leaf and seed production
- Pest and disease management requirements
- Labour requirement for leaf harvesting
- Limited availability of dual-purpose high-yielding varieties
- Need for technical knowledge for integration with sericulture

These limitations can be minimized through improved cultivation practices and farmer training programs.

Future scope

The future of castor as a dual crop is promising due to increasing emphasis on integrated farming.

Development of dual-purpose varieties

Breeding programs can focus on varieties that produce high leaf biomass and seed yield.

Expansion of eri culture

Increasing demand for eco-friendly eri silk will increase demand for castor leaves.

Value addition

Castor oil derivatives and eri silk products offer opportunities for rural entrepreneurship.

Climate-smart farming

Castor can be promoted as part of climate-resilient agriculture.

Employment generation

Integration of castor cultivation with eri rearing can create rural employment, especially for women.

Conclusion

Castor is an ideal example of a dual-purpose crop that supports both agricultural and sericultural activities. Its importance as a primary host plant for eri silkworms and as an

industrial oilseed crop makes it highly valuable in integrated farming systems. The dual income potential from leaves and seeds improves farmer profitability and reduces risk. In addition to economic advantages, castor contributes to environmental sustainability, efficient resource use, and rural employment. Although challenges such as pest management and awareness need attention, the future of castor as a dual crop is promising. Promotion of castor cultivation in eri sericulture areas can significantly contribute to sustainable agriculture and livelihood improvement. With proper research support and extension services, castor can become an important component of integrated farming systems.

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