

Women Empowerment Through Grainage Enterprises: Building Livelihoods Through Silkworm Seed Production

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Sericulture is a major agro-based rural industry that provides sustainable employment and supplementary income to millions of families, particularly in India. Among its various activities, grainage (disease-free silkworm seed production) is fundamental to ensuring healthy silkworm crops, higher cocoon yield and superior silk quality. Grainage requires precision, hygiene and technical skills rather than strenuous physical labour, making it well suited for women entrepreneurs. Through training, financial assistance and technical support from the Central Silk Board and State Sericulture Departments, women are increasingly establishing successful grainage enterprises. These enterprises promote economic independence, strengthen rural livelihoods and contribute significantly to the sustainable development of the sericulture sector.

Importance of Grainage in Sericulture

Grainage is the process of producing Disease-Free Layings (DFLs), which are essential for successful silkworm rearing. High-quality, disease-free seed ensures uniform hatching, healthy larval growth, higher cocoon yield and superior silk quality, whereas poor-quality seed reduces productivity and increases disease incidence. Grainage maintains genetic purity through careful seed cocoon selection and mother moth examination to detect *Nosema bombycis* (Pebrine). By supplying genetically pure and disease-free silkworm seed, grainage enhances cocoon productivity, improves silk quality and supports the sustainable growth of the sericulture industry.

Process of Grainage

The grainage process begins with the selection of healthy seed cocoons, followed by preservation under controlled environmental conditions, moth pairing and egg laying (Dandin & Giridhar, 2014). A critical step is the mother moth examination to detect *Nosema bombycis*, with infected egg batches discarded to prevent disease transmission. The disease-free eggs are then incubated, packed, labelled and distributed to farmers, ensuring the supply of genetically pure, high-quality silkworm seed.

Role of Women in Grainage Enterprises

Women play a crucial role in grainage enterprises, where operations such as seed cocoon selection, moth pairing, egg collection, preservation of Disease-Free Layings (DFLs), packaging and record maintenance require precision, patience and hygiene (Kankanawadi et al., 2025). Trained women also perform mother moth examination to detect *Nosema bombycis* and ensure the production of healthy silkworm seed. Through individual enterprises and Self-Help Groups (SHGs), women contribute



significantly to quality seed production, employment generation and the strengthening of the sericulture value chain (Nair & Kumar, 2004).

Skills and Training Required

Successful grainage management requires technical knowledge and skills in silkworm biology, seed cocoon selection, grainage sanitation, disease diagnosis, mother moth examination, egg preservation, incubation, packaging and quality assurance (Rajanna & Reddy, 2017). Training programmes conducted by the Central Silk Board, State Sericulture Departments and agricultural universities equip women with scientific and entrepreneurial skills, including business management, marketing and financial planning. Continuous skill development and exposure to improved technologies enhance their competence and enable them to establish sustainable and profitable grainage enterprises.



Economic Empowerment

Grainage enterprises provide women with a sustainable source of income and an opportunity to become financially independent. Unlike seasonal agricultural work, grainage offers employment in seed cocoon selection, egg production, packaging, quality testing and seed distribution. The growing demand for quality Disease-Free Layings (DFLs) ensures regular income and stable livelihood opportunities. Income generated through grainage helps women meet household expenses, support children's education, improve healthcare and nutrition and invest in agriculture or other income-generating activities. Women-led grainage enterprises also create employment for local communities, contributing to rural economic development and improving the overall standard of living.

Social Empowerment

Economic independence through grainage enhances women's confidence, technical knowledge, leadership and decision-making abilities. Women managing grainage enterprises actively participate in household and community development while gaining recognition as skilled entrepreneurs (Das, S., & Das, N. 2014). Training programmes, workshops and interactions with scientists and extension workers further strengthen their technical competence and communication skills. Successful women entrepreneurs inspire other women to adopt grainage as a livelihood, promoting gender equality and encouraging greater participation in scientific and entrepreneurial activities. Thus, grainage contributes to both social inclusion and rural development (Venkatesh, M. G., & Sivaprasad, V. 2018).

Quality Seed Production and Hygiene

Successful grainage management requires training in silkworm biology, seed cocoon selection, grainage sanitation, disease diagnosis, mother moth examination, egg preservation, incubation, packaging and quality assurance (Rajanna & Reddy, 2017). Training programmes conducted by the Central Silk Board, State Sericulture Departments and agricultural universities equip women with technical and entrepreneurial skills. Continuous capacity building and exposure to improved technologies enable women to establish sustainable and profitable grainage enterprises.

Role of Self-Help Groups (SHGs)

Women's Self-Help Groups (SHGs) play a vital role in promoting grainage enterprises and strengthening rural livelihoods. By working collectively, women can establish common grainage centres, share infrastructure and equipment, access institutional credit and reduce production costs. SHGs also facilitate collective procurement of seed cocoons, efficient marketing of Disease-Free Layings (DFLs) and better access to government subsidies and

technical training (Shravanilakshmi, V et al., 2025). In addition to improving income, SHGs promote knowledge sharing, leadership and entrepreneurship, enabling women to become successful grainage entrepreneurs and active contributors to rural development.

Government Support and Schemes

The Government of India, through the Central Silk Board (CSB), Ministry of Textiles and State Sericulture Departments, actively promotes women entrepreneurship in grainage enterprises by providing technical guidance, skill development programmes, financial assistance and infrastructure support. Women can participate in Entrepreneurship Development Programmes (EDPs) and specialized training on grainage management, disease diagnosis, mother moth examination, quality control and enterprise management. Various government schemes also provide subsidies for establishing grainage units, concessional loans through banks and microfinance institutions and support for SHGs and Farmer Producer Organizations (FPOs). Extension services, exposure visits and digital advisory platforms help women adopt modern technologies and scientific practices. These initiatives strengthen women's technical skills, improve access to resources and encourage the establishment of sustainable grainage enterprises, thereby contributing to rural employment, income generation and the overall growth of the sericulture industry (Sannappa, B., & Dandin, S. B. 2005).

Challenges Faced by Women Entrepreneurs

Despite the growing opportunities in grainage, women entrepreneurs face several challenges that affect the establishment and expansion of their enterprises. Limited access to institutional credit, inadequate awareness of government schemes and lack of collateral often restrict investment in grainage infrastructure and equipment (Singh, T., & Das, P. K. 2015). In addition, scientific seed production requires specialized technical knowledge and inadequate training or limited access to modern technologies may affect seed quality and enterprise profitability. Poor infrastructure, including insufficient laboratory facilities, unreliable electricity and inadequate storage and transportation, also hampers efficient grainage operations. Many women further face social challenges, such as balancing household responsibilities with enterprise management and having limited mobility or decision-making opportunities. Addressing these constraints through better financial support, skill development, improved infrastructure and effective extension services is essential for promoting successful women-led grainage enterprises.

Future Prospects

The future of women-led grainage enterprises is promising due to the increasing demand for quality Disease-Free Layings (DFLs) and the adoption of modern technologies. Automated environmental control systems, digital monitoring, improved disease detection methods and mobile-based advisory services are enhancing the efficiency and quality of silkworm seed production. Continued government support, scientific training and greater participation through Self-Help Groups (SHGs) and Farmer Producer Organizations (FPOs) will further encourage women to establish sustainable grainage enterprises, creating employment and strengthening the sericulture sector.

Conclusion

Grainage enterprises provide an excellent opportunity to empower women through silkworm seed production while supporting the sustainable growth of the sericulture industry. By producing high-quality Disease-Free Layings, women contribute directly to healthy silkworm crops, higher cocoon productivity and improved silk quality. With adequate training, financial assistance, modern infrastructure and institutional support, women can become successful grainage entrepreneurs, generating sustainable livelihoods and strengthening rural economies. Promoting women-led grainage enterprises is therefore an important step toward achieving economic empowerment, gender equality and the long-term development of the sericulture sector.

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