

## AGRICULTURE FORUM FOR TECHNICAL EDUCATION OF FARMING SOCIETY

Kota, Rajasthan



### A brief insight on Yardlong Bean (*Vigna unguiculata* sub sp. *sesquipedalis*)

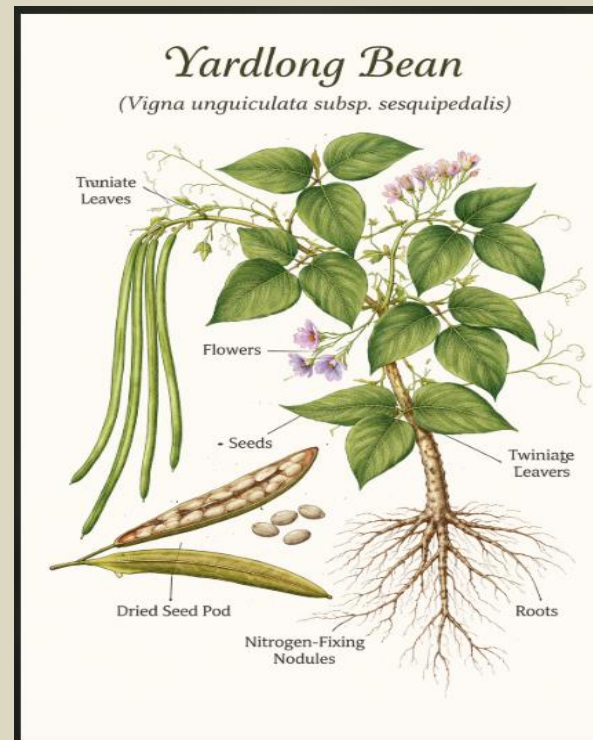
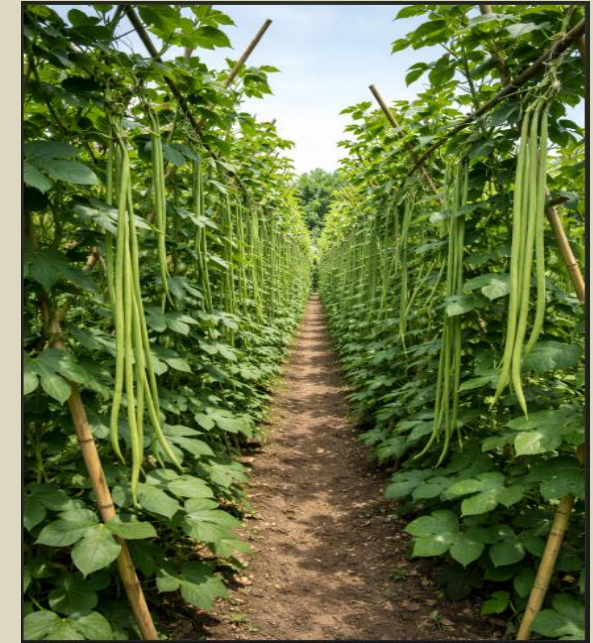
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## INTRODUCTION

Yardlong bean is a subspecies of cowpea belonging to the family Fabaceae and is cultivated primarily for its immature green pods that are consumed as a vegetable. The crop is widely grown across Asia, particularly in India, China, and Southeast Asian countries, and has gained popularity due to its high productivity and adaptability to diverse agro-climatic conditions. The plant exhibits vigorous climbing growth with long, slender pods that may reach up to one meter in length. Its short duration, continuous harvesting nature, and compatibility with various cropping systems make it an important component of vegetable-based farming systems.



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#### IMPORTANCE OF YARDLONG BEAN

Yardlong bean holds immense importance in agriculture and human nutrition due to its multifunctional role. It serves as a vital source of plant-based protein and micronutrients, particularly in developing countries where access to diverse diets is limited. The crop contributes significantly to food and nutritional security by providing an affordable and nutrient-dense vegetable option. Its leguminous nature allows it to fix atmospheric nitrogen through symbiotic association with Rhizobium bacteria, thereby improving soil fertility and reducing dependence on chemical fertilizers. Economically, yardlong bean is a profitable crop due to its high market demand, quick returns, and extended harvesting period, which ensures a continuous supply to markets. Furthermore, it fits

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well into crop rotations and intercropping systems, enhancing land-use efficiency and sustainability (Nassourou et. al., 2016).

### **NUTRITIONAL PROPERTIES**

Yardlong bean pods are nutritionally rich and constitute an important component of a balanced diet. The fresh pods contain high moisture content along with appreciable amounts of protein, carbohydrates, and dietary fibre. The protein content, though moderate compared to dry legumes, is significant for a vegetable crop and contributes to daily dietary requirements. The pods are low in fat and calories, making them suitable for health-conscious consumers. They are an excellent source of vitamins, particularly vitamin C and vitamin A, along with B-complex vitamins such as thiamine, riboflavin, niacin, and folate. The presence of essential minerals such as potassium, calcium, magnesium, and iron enhances their nutritional value and supports various physiological functions. In addition to basic nutrients, yardlong beans contain bioactive compounds including phenolics and flavonoids, which contribute to their antioxidant properties. These compounds vary depending on genotype and environmental conditions but play a crucial role in promoting health (Singh et. al., 2003).

### **HEALTH BENEFITS**

The consumption of yardlong beans provides multiple health benefits due to their rich nutritional and phytochemical composition. The antioxidant compounds present in the pods help in scavenging

free radicals, thereby reducing oxidative stress and lowering the risk of chronic diseases such as cancer and cardiovascular disorders. The high potassium content aids in regulating blood pressure and maintaining heart health, while the low-fat content contributes to cholesterol management. Dietary fibre present in the pods supports digestive health by improving bowel movement and preventing constipation (Nassourou et. al., 2016). The presence of vitamin C enhances immune function and promotes resistance to infections. Additionally, the low glycemic index and fibre content make yardlong beans beneficial for individuals with diabetes, as they help in stabilizing blood glucose levels. The folate content is particularly important for pregnant women, as it supports proper fetal development and reduces the risk of neural tube defects. Overall, the crop serves as a functional food with both nutritional and therapeutic benefits (Manjesh et. al., 2022).

### **PRODUCTION TECHNOLOGY**

#### **• CLIMATE AND AGRO-ECOLOGICAL REQUIREMENTS**

Yardlong bean is a thermophilic crop that thrives under warm and humid tropical to subtropical climates. The optimum temperature range for germination, vegetative growth, and reproductive development lies between 25–35°C, although the crop can tolerate slightly higher temperatures under adequate soil moisture conditions. Growth is severely restricted under temperatures below 15°C, and frost conditions can cause irreversible damage

to the plant. The crop performs well under moderate rainfall ranging from 600–1200 mm annually, provided drainage is adequate. Excessive rainfall and prolonged cloudy weather adversely affect flowering, pollination, and pod set. Bright sunshine promotes vigorous vegetative growth and improves pod quality. Yardlong bean is considered a short-day plant in certain genotypes, but many improved cultivars are photoperiod insensitive, allowing year-round cultivation in suitable regions (Manjesh et. al., 2022).

#### **• SOIL REQUIREMENTS AND FIELD SELECTION**

The crop grows best in well-drained sandy loam to loamy soils rich in organic matter. Heavy clay soils with poor drainage are unsuitable as they promote root diseases and inhibit nodulation. A slightly acidic to neutral soil reaction (pH 5.5–7.5) is ideal for optimal nutrient availability and microbial activity. Fields with a history of legume cultivation should be managed carefully to avoid soil-borne diseases. Proper field selection with good drainage and exposure to sunlight is essential for maximizing productivity.

#### **• VARIETAL SELECTION AND GENETIC IMPROVEMENT**

The choice of variety plays a crucial role in determining yield, pod quality, and resistance to biotic and abiotic stresses. Improved varieties such as Pusa Komal, Arka Mangala, Arka Suman, and region-specific selections like BARI Barboti lines have been developed with traits such as long,

tender pods, uniformity, early maturity, and tolerance to pests and diseases. Breeding programs have focused on improving pod length, reducing fibre content, enhancing nutritional quality, and developing resistance to viral and fungal diseases. Hybrid development and selection of climate-resilient genotypes are emerging areas of research for increasing productivity under changing climatic conditions (Manjesh et. al., 2022).

- **LAND PREPARATION AND SOIL MANAGEMENT**

Proper land preparation is essential to create a favorable soil environment for seed germination and root development. The field is ploughed two to three times followed by harrowing to achieve a fine tilth. All weeds, stubbles, and previous crop residues should be removed. Incorporation of well-decomposed farmyard manure or compost at the rate of 15–20 tonnes per hectare during the final ploughing improves soil structure, water-holding capacity, and microbial activity. Raised beds or ridges are often preferred in areas prone to waterlogging, as they facilitate better drainage and root aeration (Singh et. al., 2003).

- **SEED SELECTION, TREATMENT, AND SOWING**

The use of high-quality, certified seeds ensures better germination and uniform crop stand. Seeds should be bold, healthy, and free from mechanical damage and disease infection. Pre-sowing seed treatment with fungicides such as carbendazim or bioagents like **Trichoderma** helps in preventing seed and soil-borne diseases.

Inoculation with **Rhizobium** culture specific to cowpea enhances nodulation and nitrogen fixation, thereby improving plant growth and yield.

Sowing time varies depending on the region, but it is generally cultivated during kharif and summer seasons in India. In regions with mild winters, it can also be grown during Rabi. Seeds are sown either on flat beds, ridges, or raised beds at a depth of 2–3 cm. Proper spacing of 45–60 cm between rows and 30–45 cm between plants ensures adequate aeration and reduces competition for nutrients and light. The seed rate ranges from 20–25 kg per hectare, depending on seed size and spacing.

- **NUTRIENT MANAGEMENT AND SOIL FERTILITY ENHANCEMENT**

Although yardlong bean is capable of fixing atmospheric nitrogen through symbiosis with **Rhizobium**, an initial starter dose of nitrogen is required to support early vegetative growth before nodulation becomes effective. A recommended fertilizer dose of 20 kg nitrogen, 60 kg phosphorus, and 40 kg potassium per hectare is applied as basal. Phosphorus is particularly important for root development, nodulation, and energy transfer, while potassium enhances stress tolerance, disease resistance, and overall plant vigour (Suri et. al., 2024).

In addition to macronutrients, the application of micronutrients such as zinc, boron, and molybdenum can improve flowering, pod setting, and overall yield. Integration of organic manures, green manuring, and biofertilizers such as

**Azospirillum** and phosphate-solubilizing bacteria contributes to sustainable soil fertility management. Foliar sprays of nutrients during critical stages such as flowering and pod development can further enhance productivity.

- **IRRIGATION AND WATER MANAGEMENT**

Yardlong bean requires a consistent and adequate supply of moisture throughout its growth period. Irrigation scheduling depends on soil type, climate, and crop stage. Frequent but light irrigation is preferred, particularly during flowering and pod formation stages, as moisture stress during these stages can lead to flower drop, poor pod set, and reduced yield (Manjesh et. al., 2022). Drip irrigation is highly efficient in conserving water and ensuring uniform moisture distribution. However, over-irrigation should be avoided as it may lead to waterlogging, root rot, and reduced oxygen availability in the root zone.

- **STAKING, TRELLISING, AND CANOPY MANAGEMENT**

Being a vigorous climbing plant, yardlong bean requires support for optimal growth and yield. Staking or trellis systems are essential to keep the vines off the ground, reduce disease incidence, and improve pod quality. Common systems include bamboo stakes, vertical trellises, and overhead pandal systems. Proper training of vines enhances light interception, facilitates air circulation, and makes harvesting easier. Canopy management through pruning of excessive vegetative growth may also be practiced to balance vegetative and reproductive growth (Suri et. al., 2024).

- **WEED MANAGEMENT**

Weed competition is most critical during the early stages of crop growth. Weeds compete for nutrients, water, and sunlight, leading to reduced crop growth and yield. Two to three manual weeding at 15–20 days intervals are generally sufficient to maintain a weed-free field. Mulching with organic materials such as straw or plastic mulch helps in suppressing weeds, conserving soil moisture, and regulating soil temperature. Chemical weed control may be adopted using selective herbicides, but it should be integrated with cultural practices for effective management.

- **INTERCULTURAL OPERATIONS**

Intercultural practices such as hoeing, earthing up, and thinning are important for maintaining soil health and plant vigour. Hoeing improves soil aeration and facilitates better root growth, while earthing up provides support to the plants and prevents lodging. Thinning ensures proper plant spacing and reduces competition. Regular monitoring of the crop helps in early detection of nutrient deficiencies, pests, and diseases, allowing timely corrective measures (Suri et. al., 2024).

- **PEST MANAGEMENT**

Yardlong bean is susceptible to several insect pests including aphids, jassids, thrips, pod borers, and leaf

miners. These pests cause damage by sucking sap, feeding on leaves, and boring into pods, leading to significant yield losses. Integrated pest management strategies involving cultural, biological, and chemical methods are recommended. Use of resistant varieties, timely sowing, crop rotation, and maintenance of field hygiene help in reducing pest incidence. Biological control agents such as parasitoids and predators play a crucial role in pest regulation. Neem-based formulations and other botanical pesticides are effective and environmentally safe options. Chemical pesticides should be used judiciously as a last resort.

- **DISEASE MANAGEMENT**

The crop is affected by several diseases such as mosaic virus, powdery mildew, anthracnose, and root rot. Viral diseases are often transmitted by insect vectors like aphids and whiteflies, making vector control essential. Use of disease-free seeds, resistant varieties, and crop rotation helps in minimizing disease incidence. Proper spacing and staking reduce humidity within the canopy, thereby lowering the risk of fungal infections. Fungicides may be applied when necessary to control severe outbreaks. Adoption of integrated disease management practices ensures sustainable crop protection.

- **HARVESTING AND CROP DURATION**

Yardlong bean is an early maturing crop, with harvesting commencing approximately 45–60 days after sowing depending on the variety and growing conditions. Pods are harvested at the tender stage when they are fully elongated, green, and free from fibre development. Delayed harvesting results in reduced quality and market value. Harvesting is carried out at regular intervals of 2–3 days to encourage continuous flowering and pod production. The crop continues to produce pods for several weeks, allowing multiple harvests and sustained income.

- **YIELD POTENTIAL**

The yield of yardlong bean depends on variety, management practices, and environmental conditions. Under optimum conditions and improved cultivation practices, the crop can yield between 8–15 tonnes per hectare (Singh et. al., 2003). With the adoption of advanced technologies such as improved hybrids, drip irrigation, and integrated nutrient management, higher yields can be achieved. Continuous harvesting and proper crop management significantly contribute to increased productivity and profitability.

## POST-HARVEST MANAGEMENT

Post-harvest management of yardlong bean is crucial due to its highly perishable nature. Harvesting should be carried out at the tender stage to ensure maximum quality, as over-mature pods become fibrous and lose market value. After harvesting, pods should be handled carefully to avoid mechanical damage, which can accelerate deterioration. Cleaning and sorting are performed to remove damaged, diseased, or deformed pods, followed by grading based on size, colour, and uniformity.

Proper packaging is essential to maintain quality during storage and transportation. Materials such as perforated plastic bags, bamboo baskets, or ventilated crates are commonly used to allow adequate air circulation and reduce moisture accumulation. Storage at low temperatures, typically between 8 to 10°C with high relative humidity, helps in extending shelf life by slowing down respiration and moisture loss. Under ambient conditions, the shelf life is relatively short, usually ranging from four to seven days (Singh et. al., 2003).

Transportation should be carried out under conditions that minimize physical damage and temperature fluctuations. The development of cold chain infrastructure can significantly reduce post-harvest losses and improve marketability. Value

addition through processing into frozen, dehydrated, or pickled products offers opportunities to enhance shelf life and increase economic returns. Efficient post-harvest handling practices are therefore essential to preserve quality, reduce losses, and ensure better profitability for farmers.

## CONSTRAINTS AND FUTURE PROSPECTS

Despite its advantages, the cultivation of yardlong bean faces several constraints, including susceptibility to pests and diseases, lack of improved varieties, and inadequate post-harvest infrastructure. Addressing these challenges requires the development of high-yielding and disease-resistant varieties, improved agronomic practices, and better storage and transportation facilities. The integration of modern technologies such as protected cultivation, precision farming, and value chain development can further enhance productivity and profitability. With increasing awareness of nutrition and sustainable agriculture, yardlong bean has significant potential to contribute to future food systems.

## CONCLUSION

Yardlong bean is an important vegetable legume with considerable nutritional, economic, and ecological significance. Its rich nutrient profile,

health-promoting properties, and ability to improve soil fertility make it a valuable crop in sustainable agriculture. The adoption of improved production technologies and efficient post-harvest management practices can significantly enhance yield, quality, and profitability. As global emphasis shifts toward nutritional security and environmentally sustainable farming, yardlong bean is poised to play a crucial role in achieving these goals.