Ethiopian ATI
Agricultural Transformation Institute
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COMMON BEAN PRODUCTION AND PROCESSING BUSINESS

TRAINING COURSE FOR YOUTH AGRI-ENTREPRENEURS

Ethiopian Agricultural Transformation Institute

ADDIS ABABA, ETHIOPIA
2025

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OVERVIEW OF THE MODULE

This Technical Training Module on Common Bean Production and Processing Business is designed to equip women and youth groups engaged in common bean agribusiness with essential technical skills. It also supports training facilitators by providing structured guidance focused on key areas: production, processing, and marketing.

The module serves as a resource for developing PowerPoint presentations, digital/online and offline training materials, and printed handouts for trainees. Its primary objective is to enhance the technical capacity of youth and women groups interested in pursuing a market-driven approach to common bean production and processing.

- The module is organized into six sections and includes:
- Background on common bean production
- Pre-planting and planting activities
- Crop management practices
- Harvesting and post-harvest handling
- Value addition
- Financial feasibility

The Agriculture-focused Dignified Employment for Youth (ADEY) program is implemented by the Ethiopian Agricultural Transformation Institute in partnership with the Mastercard Foundation to enable 611,343 inclusive and dignified work opportunities for young women and men and support youth entrepreneurship, employability, and sustainable livelihoods in the agribusiness sector.

INTRODUCTION

Common bean is one of Ethiopia's most important pulse crops, significantly contributing to both the national economy and food security. As a highly nutritious crop, it serves growing domestic demand while also offering strong export potential. Its role as a leading exportable pulse makes it a viable income-generating crop, particularly for women and youth-led agribusinesses.

Ethiopia's favorable agro-ecological conditions, especially in lowland areas, coupled with the availability of arable land, improved varieties, and low production costs, provide promising opportunities for scaling up common bean production. For instance, the Rift Valley region is a major production hub for export-quality common bean varieties, with access to both local markets and export channels via the Addis–Djibouti railway network.

Beyond its economic and nutritional value, common bean offers various business diversification opportunities across its value chain. These include both primary and secondary value addition activities, as well as income-generating uses for its by-products—such as husk and hull—which are suitable for animal feed, particularly in peri-urban and urban dairy farming. Additionally, its compatibility with intercropping, rotational, and double cropping systems makes it an efficient choice for enhancing land productivity and maximizing income from small plots.

Target groups: The primary beneficiaries of this module are youth agri-entrepreneurs, youth groups, and small to medium enterprises (SMEs) interested in establishing or scaling up common bean production and processing businesses. The module aims to strengthen their technical and entrepreneurial skills for engaging in market-oriented agribusiness.

Duration of the Training: The complete training module is designed to be delivered in approximately 13½ effective hours, using a combination of participatory and practical methodologies.

Training methods: Brainstorming questions, group discussions, presentations, success story sharing, self-learning rules, learning questions, key messages, and post-assessment exercises.

Training materials needed: Flip chart, LCD projector, markers, pens, notebooks, sticky notes, common bean seed, biofertilizers, improved seeds, sample pesticides, sprayer, and other materials required for practical demonstrations.

SECTION 1. COMMON BEAN PRODUCTION

This section covers about the main economic importance of the crop and its suitable agro-ecological requirements in Ethiopian agro-ecological context.

Learning outcome

At the end of this section male and female participants will be able to:

- Describe the importance of common bean.
- Describe the nutritional and income generation value of the common bean

Time Required: 1 ½ hours

Learning question

1. *Explain how common bean is consumed in traditional dish.*
2. *Describe nutritional value of common bean.*
3. *Describe how common bean enhances soil fertility.*

1.1 COMMON BEAN

Common bean (Phaseolus vulgaris) is one of the most important pulses grown and consumed globally. Since Ethiopia is the largest exporter of common bean in Africa, it is widely grown in Ethiopia and is an important export commodity for food and income generation for smallholder farmer. It is an herbaceous annual plant grown worldwide for its edible dry seeds or green unripe pods. Its leaf is also occasionally used as a vegetable and the straw as fodder and it is classified either as bush beans (determinate and indeterminate) or climbing beans, depending on their style of growth habit. Being high in nutrient content and having commercial potential, common beans hold great promise for fighting hunger, increasing income, and improving soil fertility. Ethiopia is the largest exporter of common beans in Africa, contributing 41% of African common bean exports, revealing high potential global demand for the producers in general and youth Agri-entrepreneurs in particular.

The area and volume of production is substantially increasing from time to time due to its high local and global demand. In Ethiopia, for instance, more than 3.9 million farmers produced about 5,525,640 quintals on 311,584 hectares of land in the year 2022. Despite the national average productivity being about 18 quintals per hectare, it is still possible to increase to an average of 32 quintals per hectare to enhance the marginal revenue.

It is consumed in traditional dishes such as nifro (boiled grain), mixed with sorghum or maize or with wasa and wat (local sauce) and with kocho. Fresh beans (mature and green pods) are a vegetable for local consumption and export. Common beans provide an important source of protein (22%), vitamins and minerals such as Calcium (Ca), Cupper (Cu), Iron (Fe), Magnesium (Mg), Manganese (Mn) and Zinc (Zn). The white common bean has got its current popular name because it was a staple food of the United States Navy in the early 20th century. These small white beans are perfect for making baked beans.

1.2 ECOLOGICAL REQUIREMENT OF COMMON BEAN

Table 1. Registered desert banana varieties in Ethiopia

AGROECOLOGICAL SUITABILITY/OPTIMUM	OPTIMUM CONDITIONS
Altitude	The most suitable agro-ecological zones of wheat fall between 1900-to-2700-meter asl.
Temperature	Optimum of 180C–24 0C. But it is also possible to grow Temperature range of 100C–32 0C
Rainfall and relative humidity:	distributed rainfall of 300 to 600 mm (70 to 100 days) and the relative humidity should not exceed 75%.
Soil pH	It grows on well-drained, loamy soils with pH ranging from 5.5 to 7.0

Soil types	It is best adapted to fertile, well-drained clay soil, sandy-clay soils. Common beans are extremely sensitive to waterlogged soil conditions and saline soils

Most of the released varieties currently under production are also adaptable to 100C–32 0C temperature, 850–20000C altitudinal ranges, and can be matured from 105 days (early types) to 120 days (late mature types). For example, Dandessu (climbing type) variety has 105 days to maturity whereas melka dima, Ibado varieties have 120 days to maturity. In general, Awash-1, Awash-2, Awash melka, Nasir, and Dimtu varieties are the most demanded varieties for exporting whereas red and small seed size of the varieties are locally popular.

1.3 CHALLENGES AND OPPORTUNITIES IN COMMON BEAN PRODUCTION PRACTICES

Table 1. Registered desert banana varieties in Ethiopia

VALUE CHAIN	CHALLENGES	OPPORTUNITY
Technology	1. Limited postharvest handling technologies, 2. Shortage of mechanization service	Established research institutions and infrastructure to promote bean production in Ethiopia.
Input	Shortage of seed in quality and quantity Poor utilization of biofertilizers	Market driven improved varieties and possibility to multiply as community-based seed productions to enhance availability.
Production	1. Poor perception on the importance of crops as potential agribusiness opportunities 2. Moisture stress, Pest competition 3. Less focus on post-harvest handling	1. Conducive agroecology. 2. Enabling government policy. 3. The willingness of private companies to collaborate on bean production. 4. Extension service providers.
Processing/value addition	Poor awareness about value addition practices (e.g sorting inters of grain size and shape)	1. The possibility of value addition. 2. Availability of Agro-processing plants/factories (IAIPs)
Distribution	Weak distribution channel	I1. nfrastructure development 3. Market information system
Marketing	Prices fluctuation, Many market actors	Increasing demand for beans at domestic, regional, and international levels.
Consumption	Gaps on how to use in different form	Increasing local demand

Post assessment questions

1. *Briefly describe the benefits of cultivating common bean.*
2. *Describe suitable agroecology and soil condition for planting common bean.*

SECTION 2. PRE-PLANTING AND PLANTING ACTIVITIES

Overview

This section provides an overview of the pre-planting and planting phases, which are critical for laying the groundwork for a successful common bean harvest. These stages directly influence plant establishment, growth, yield, and quality.

By carefully implementing the recommended pre-planting and planting practices, producers can optimize crop performance and minimize risks. Effective planning, timely field preparation, and appropriate input selection are essential for maximizing productivity and ensuring the long-term success of common bean agribusiness ventures.

Learning outcome

At the end of this section, the trainees will be able to understand about:

1. *The pre-planting operation in common bean fields.*
2. *Major pre-planting and planting activities for common bean production.*

Duration: 6 ½ hours

Learning question

1. *Explain common bean planting methods experienced in your area.*
2. *List major field operations for planting common bean.*

2.1 SITE SELECTION AND PREPARATION

- Site selection: Soil fertility and drainage, crop rotation sequence, weed infestation and moisture holding capacity of the soil are crucial for site selection.
- Select fertile to moderately fertile land with no water logging.
- Since Common bean does not tolerate acidic soils better to select nonacidic soil or manage acidic soil with lime
- To break disease cycle better to rotate with cereal crops

Land preparation:

- Clear all vegetation and prepare the field manually with a hoe, or use animal power or a tractor

The good field for bean growing is one that receives enough sunlight and has well-drained soil

- The land should be ploughed at least twice
- A first plow should be done after harvesting the previous crop.
- A second and sometimes third plowing is made before sowing depending on the soil condition.
- Dry ploughing is also important to control important weeds by exposing their seed banks, and other propagules to sun and seed predators.

Well-prepared lands ensure good seed germination and reduces weed infestation

Fig 1. Traditional plough (Top) Improved plough (Bottom)

2.2 SEED AND VARIETAL SELECTION

- Select a good bean variety which suits your agro-ecological zone.
- At high-land and high Rain-fall areas climbing beans are recommended and bush beans(non-climbing) suitable for mid to low land areas
- Fix your seed and parcel size before planting (when seed size increased seed rate also increased and when seed size decreased seed rate also decreased
- Make sure your variety growth habit and maturity date before planting
- Do a germination test at least 10 days before time of planting to fix the amount seed you are going to plant
- Use only high-quality seed for plant

Table 3: Lists of varieties along with agro-ecological suitability

NO	VARIETY NAME	SEED COLOR AND SIZE	GRAIN YIELD (TON HA-1)	DAYS TO MATURITY (DAYS)	AGROECOLOGICAL ZONES
1	Belete	Large speckled	23- 26	76	1100-1950; moisture stress areas such as central rift valley, Eastern and North eastern and southern lowland areas and similar agro ecologies
2	Keye Bure Metene	Large mottled	23- 26	95	Lowland to mid land areas of the country like Melkassa, Alemtena, A/negelle, Jimma, Hawassa, Sirinka, Areka and similar agro ecologies; 1100-1950 masl
3	Keyyo	Medium red	27	83	Lowland to mid land areas of the country like Melkassa, Alemtena, A/negelle, Jimma, Hawassa, Sirinka, Areka and similar agro ecologies; 1100-1950 masl
4	Gorossa	Large mottled	17- 27	89	1100-1950; moisture stress areas like central rift valley and similar agro-ecologies
5	Zo asho	Large red	19- 24	87	1100-1950; moisture stress areas like central rift valley and similar agro-ecologies
6	SER-119	Small red	33	85-105	Central Rift Valley, Southern, Southwestern, Western, Northwestern, North eastern- Eastern
7	SER-125	Small red	35	85-105	Central Rift Valley, Southern, Southwestern, Western, Northwestern, North eastern- Eastern
8	Tafach	Large speckled	22- 26	85-90	1300-1800 masl; moisture stress areas such as Central Rift Valley and similar agro ecologies
9	Small white	Small white	28- 31	85-90	moisture stress areas like central rift valley and similar agro-ecologies
10	Nasir	Small red	20	86- 88	All bean growing areas
11	Ibado	Large mottled	29	90- 120	Sidama, Wolaita and similar areas of Southern Ethiopia
12	Hawassa Dume	Small red	25- 30	85- 90	Sidama, Wolaita and similar areas of Southern Ethiopia

2.2.1 SOWING/PLANTING TIME

- Most types of bean require a frost-free growing season of 85 to 120 days.
- The best sowing time under rainfed conditions is when rain moistens soil for germination.
- Beans take 75-95 days to reach maturity at medium altitudes (1000- 1700 masl) and about 160 days at higher altitudes (1800-2200 masl).
- Sowing should be done about 70 days before the end of the rains at medium altitudes and about 100 days before the end of the rains at high altitudes.
- Late sowing will lower yield.
- Recommended planting time in different regions of common bean growing areas are summarized as follows.

Table 4: Planting time of common bean against different regions

LOCATIONS/REGIONS	RAINY SEASON	PLANTING TIME
South Ethiopia	Mid-March	Starting end of March
Southwest Ethiopia	Mid-April	Starting June
Central Rift valley areas,	Early June-Mid June	Mid-June-Early July
Eastern regions/Harare	May-Mid October	End of July-Early August
North Ethiopia/ Amhara region	May-Mid October	End of July-Early August
Northwest areas	May-Mid October	End of July-Early August
Western areas	May-October	Mid-June to Early-July
Note that the planting time under irrigation condition as per crop Calander set.		

2.3 SOWING METHOD

1. Common beans should be sown in rows for easier field management operation.

- *The general recommends spacing is 40 cm between rows and 10 cm between plants.*

2. On average, 70 to 110 kg seed is needed for one hectare based on seed size.

- *For small sized verities like Dimtu, Wedo, Melka Dima, Nasir, Awash 1, Awash 2, 70-80 kg seed per hectare is required*
- *For medium to large size seed varieties like Dame, Ibado, Goberasha, Batu, 100-110 kg seed per hectare is required.*

3. The row sowing can be done by hand or by a seed drill.
4. Seed can be sown by making a furrow with the plough, place seed in the furrow and cover with soil from the next furrow.
5. If broadcasting is used as the last option, the seed can be covered by plowing with an ox plough or by disc harrowing.
6. Sowing depth is generally between 3 and 5cm though the exact depth depends mainly on soil moisture status.

Figure 2: Row planting method

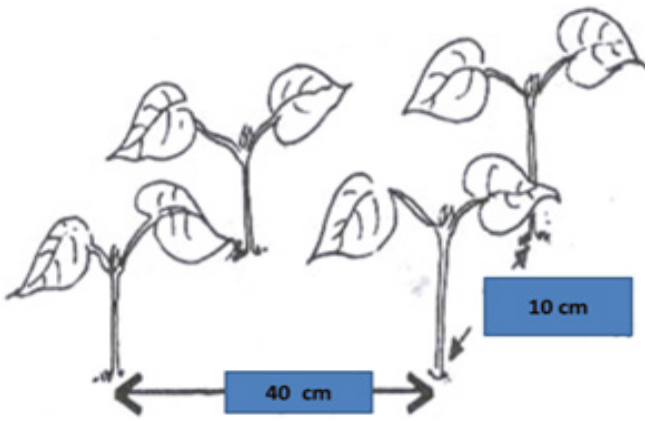


Figure 3. Fertilizer measuring for one plant

Planting bush beans in a monoculture

- Plant when the soil is moist
- Fill gaps one to two weeks after planting when plants have emerged.

Planting in rows has many advantages- you use the correct plant density; weeding is easier, and harvesting takes less time.Planting bush beans in a mixed culture

- Bush beans can be intercropped with maize, sorghum, coffee or enset.
- Especially shade tolerant and early maturing varieties of bush beans are suitable for intercropping.
- To reduce the shading effect, multiple rows of bush bean can be planted after two rows of a cereal crop.

Planting climbing beans

- Plant climbing bean varieties in rows having 50 cm row spacing.
- 25 cm intra row spacing (seed to seed spacing)
- 2 seeds per hill must be planted Climbing bean varieties grow taller than bush varieties and can therefore attain higher yields on the same land area.
- To grow tall, climbing bean requires staking which provides support to the plants.
- Different staking methods can be used, but the highest yields are obtained with stakes that are at least 175 cm long.
- The higher and stronger the stakes are and the more stakes you use, the higher the yield you obtain

- Start staking two weeks after germination.

Different types of staking methods

2.4 PLANT NUTRIENT MANAGEMENT USING BIO-FERTILIZERS

Bio-fertilizer is one of the best alternatives to increase crop yield, improve and restore soil fertility, stimulate plant growth and reduce production cost.

Beans, like any pulse crop, can enhance soil fertility through rhizobium bacteria, and since these bacteria cannot exist on some soils, it is necessary to replace them with seeds to increase the yield of beans. The use of bio-fertilizer during sowing common beans is essential, and it is necessary to sow 500 grams of common bean biofertilizer with 70-110 kg bean seed for one hectare.

To be able to form nodules and fix nitrogen, bean seeds need to be inoculated with rhizobia. Each legume crop needs a different type of rhizobium bacteria, so always check you have the right inoculant for each bean variety.

Steps how to inoculate common bean seeds / Directions for using inoculants can be found on the package

1. Measure 18-28 kg of common bean seed which is enough to plant for a quarter hectare. Place it in any container that will accommodate the seeds.
2. Measure one soda bottle (300 ml) of clean warm water.
3. Pour the water into a larger bottle (500 ml plastic bottle) so that it is easier to mix the sugar.
4. Add 2 tablespoons of sugar to the water.
5. Mix thoroughly to get an even solution of sugar, which is used as the sticker.
6. Add the sticker to the seed.
7. Mix the seed with sticker solution until all the seeds are evenly coated with the sticker and leave under shade till moisture disappears.
8. Add 125 gram (1 sachet) of the inoculant onto the seeds and sticker.
9. Mix the seeds and the inoculant thoroughly but gently until all seeds are uniformly covered with the inoculant.
10. Protect the inoculated seed from direct sunlight by covering the container with cloth or keeping it under a shade until planted.
11. When one person sows the inoculated bean seeds in a line, the other person covers the soil behind them to help prevent the small parts from being exposed to direct sunlight.

Facts about inoculants:

- The roots of legumes and rhizobium bacteria work together to biologically fix nitrogen.
- Inoculants contain the bacteria that help the beans to make nitrogen.
- Inoculants are much cheaper than nitrogen fertilizer.
- Each legume crop needs a different type of rhizobium bacteria, so always check you
- Have the right inoculant for the crop you want to sow.
- Inoculants lose their effectiveness when stored in an open package. Therefore do not open the package until you are ready to use it.
- Inoculants also lose their effectiveness when exposed to heat or direct sunlight. Therefore always store the package in a cool place in the house.
- Directions for using inoculants can be found on the package.

- When mixing the seed with innoculant better to mix under shade to avoide direct sunlight How to inoculate depends on the type of inoculant you use. Always check the instructions on the package or ask an agro-dealer or extension worker.

2.5 CHEMICAL FERTILIZER APPLICATION

1. Application of nitrogen

- Common beans do not need inorganic nitrogen fertilizer if the soil has effective rhizobium or inoculated with effective biofertilizer
- However, if the soil is infertile and ineffective rhizobium in the soil, the plant will show the leaf yellowing. Therefore, 50-100 kg ha-1 of UREA can be applied at the early growth stage.

1. 100 kg NPS or 100 kg DAP fertilizer recommended for a hectare of land
2. Applied during planting based on the fertility status of the soil
3. Place fertilizer directly in the furrows made for planting and cover with 2-3 cm soil.
4. For sole planting of common beans, we can use a teaspoon or soda bottle-cap to measure the amount of fertilizer and apply it in the furrows near each seed.

Post assessment questions

1. *List the most common widely grown varieties of common bean in Ethiopia*
2. *Describe basic steps of inoculating common bean seeds with biofertilizers*
3. *Tell us the recommended NPS inorganic fertilizer for common bean production*

Key message

1. *Common bean production is relatively low cost of production*
2. *Use of biofertilizer is the cheapest fertilizer*

SECTION 3. CROP MANAGEMENT PRACTICES

Overview

Common bean production requires careful crop management practices to achieve optimal yields and quality. By implementing the key crop management practices, common bean producers can optimize yields, quality, and profitability in their production systems. This section mainly focuses on cropping systems and pest management options.

Learning outcome

At the end of this section, the trainees will be able to understand about:

- *Major crop management practices for common bean production.*
- *Major common bean pests of and management options.*

Duration: 6 hours

Learning question

1. *Explain the major common bean cropping systems employed in your area.*
2. *List at the major insect pests, diseases and weed species of common bean.*

3.1 COMMON BEAN-BASED CROPPING SYSTEM

Growing beans in different forms of multiple cropping systems such as relay cropping and mixed intercropping with staple cereals helps to improve productivity of land and maintenance of soil fertility.

3.1.1 CROP ROTATION

In general, it is not advisable to grow a single crop continuously on the same field season after season (mono-cropping).

Crop rotation decreases the risk of disease, insect pest, and weed problems and helps to enhance productivity.

Enhance soil structure, boost soil fertility, reduce soil erosion and depletion, increase the productivity of the plot thereby raises crop yield

Beans should not be grown more often than every 2nd to 3rd year on the same land.

Legume-cereal-il Crops-Legume based rotational cycle is important to enhance productivity and reduce pest intervention. For example, maize or tef or other cereal adaptable to common bean agroecology areas can be planted on the same plots of land after common bean production.

3.1.2 INTERCROPPING

If the main target of agri-entrepreneur is maize production and processing business, the common bean can be intercropped as secondary crops as means of income diversification

Common bean can be planted at the center of maize rows. In other words, maturing bean varieties planted simultaneously with maize in 2 maizes:1 bean intercrop pattern can give sustainable yield and income advantage.

Note that intercropping is not recommended if the production is targeted for export purpose and for quality seed production.

Intercropping can promote climate resilience through higher plant resource efficiency (space, nutrients, and water) and natural suppression of insect pests, pathogens, and weeds

Figure3: Common bean intercropped between rows maize

3.1.3 RELAY CROPPING

1. The common bean should be inter-sown at the maize physiological maturity stage or before green cob maize is harvested.
2. This is mainly practiced under rain-fed on light vertisol to use the residual soil and moisture.
3. The seed rate of early types of common bean for relay cropping in maize is 120-200 kg ha-1 depending on the size of the seeds and residual moisture of the soil.
4. The common bean crop is relayed in maize mainly by broadcasting methods.
5. Application of fertilizer is not required for relay cropping of common bean as it can use the residual nutrient and moisture content of the soil.
6. The maize should carefully be harvested after its harvest maturity
7. A form of intercropping where two or more crops are grown simultaneously during part of their life cycles.
8. Intercropping often involves maize and legumes, which increases nitrogen fixing in soils and increased biomass production.

- The second (or succeeding) crop is planted after the reproductive stage (flowering) of the existing crop but before harvesting.
- Some of the advantages of relay cropping include better erosion control due to crop cover, reduced spreading of pests and diseases, and crop diversification, plus general soil health.
- There are also potential socio-economic benefits for farmers as in many cases relay cropping increases crop productivity.

- However, this form of intercropping is not easily implemented in large-scale agricultural systems due to complications in weed control and challenges associated with operating mechanized equipment on fields with relay cropping.

Figure 4. Example of common bean relayed in maize after its physiological maturity

3.2 INSECT PEST, DISEASE AND WEED MANAGEMENT

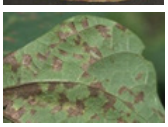
Insect pests, diseases, and weeds are major challenges in common bean production, as they can cause significant yield losses if not managed effectively. Integrated pest management (IPM) strategies that combine cultural, biological, and chemical control methods are commonly used to mitigate the impact of these pests and diseases.

3.2.1 MAJOR BEAN DISEASES AND THEIR CONTROL

Common beans suffer from a wide range of leaf, stem and root diseases including common bacteria blight (CBB), rust, anthracnose, angular leaf spot, floury leaf spot, web blight, halo blight and bean common mosaic virus (BCMV).

In Ethiopia CBB, rust and anthracnose are the most important and are widely distributed

Common bean major diseases, their symptoms and control methods

MAJOR DISEASE	SYMPTOMS IN PICTURE	CONTROL MEASURE
Common bacterial blight (CBB) 1. Caused by bacterium, 2. It is most prevalent in the low altitude areas 3. Causes a yield loss up to 21%.		1. Seed treatment with copper fungicides 2. Cultural controls: crop rotation, deep ploughing, dry weeding and use of disease-free seeds 3. Use of resistant varieties
Anthracnose 1. Caused by fungus 2. It can cause yield losses up to 100%	 	1. Use of healthy seed 2. Apply crop rotation 3. Plant resistant variety, use certified disease free seed 4. Treatment of seeds with Benomyl (2.5g/kg of seed) 5. Spray with Benomyl (0.4kg/ha) and Mancozeb (00.2% concentration) alternatively in 5 to 7 days interval from just before flowering to harvest.
Bean rust 1. Caused by a fungal species 2. Up to 85% loss reported		1. Use varieties (e.g. Awash Melka) 2. Apply crop rotation 3. Spraying mancozeb or systemic fungicides at different crop growth stages as per its guideline 4. Plant resistant variety, remove and destroy infected crop debris,
Angular leaf spot 1. Debris and infected seed are sources of infection. 2. Wind, wind-driven rain, and soil are means of dissemination.	 	1. Use certified seeds 2. Burial of infected debris, 3. Use crop rotation and intercropping practices 4. Use seed dressing fungicidal as per recommendation

3.2.2 MAJOR INSECT PESTS AND THEIR CONTROL

Insect pests that commonly affect common bean production include bean beetles, thrips, and aphids.

These pests can cause damage to the plant by feeding on leaves, pods, and seeds, leading to reduced yield and quality.

Common bean major insect pests, diseases, their symptoms and control methods were summarized as follows.

MAJOR DISEASE	SYMPTOMS IN PICTURE	CONTROL MEASURE
Bean stem maggot/bean fly 1. Caused by bacterium, 2. It is most prevalent in the low altitude areas 3. Causes a yield loss up to 21%.		1. Early sowing of beans in the drier areas 2. Use of higher plant densities (300,000-500,000 seeds/ha) 3. Use resistant variety (e.g Melke) 4. Seed dressing with endosulfan at the rate of 5g a.i/kg
African Ball Worm 1. Insects cause heavy damage to flower buds and pods. 2. One caterpillar can damage several pods and buds.		1. Strip cropping of 10-15 rows of bean with two rows of maize 2. Intercropping practices 3. Use of cypermethrin, at 150g a.i/ha
Common bean weevil & Mexican bean weevil 1. Major storage pest of pulses 2. Starts to attack the beans in the field & continues in storage. 3. The eggs are deposited loosely around the beans or in cracks in the pods.	 	1. Remove alternative plant hosts 2. Use tolerant varieties and certified seeds 3. Clean storage places and materials 4. Lower storage temp. to less than 10°C 5. Use pesticides like Actellic 2% dust, Pirimiphos-methyl.
Once inside the bean, the larval and pupal stages last around 23 days.		Fumigating stores with fumigants like aluminum phosphide tablets.

Precautions:

- For export commodities, the regulatory measures are tight; there is zero tolerance, and all consignments are required to be fumigated regularly from harvest, storage and during transportation by exporters and importers.
- Beans that are bound for the export markets are fumigated during storage and before shipment at the port regardless of infestation evidence.
- Use only nationally registered chemicals,
- All appropriate safety measures and precautions must be taken.
- The application is done by laying down gas-proof plastic sheeting or a tarpaulin and then stacking the bags on it.

3.2.3 WEED MANAGEMENT

- Common beans are very sensitive to weeds, particularly at the early stage of establishment and canopy formation.
- Weeding later in the season reduces bean yields due to mechanical damage.
- Weeding is much easier if the beans are planted in rows. Leaving beans un-weeded can result in 37-64% yield losses.

Major weeds species in common bean fields

- Guizotia scabra
- Amaranthus hybridus
- Parthenium
- Nicandra physalises'
- Xanthium strumarium
- Cyprus esculantus

Critical weed-free period

- Common beans should be kept weed-free from 3-6 weeks after planting or when canopy development is enough to suppress weeds.
- This period depends upon the competitiveness of the variety and its spacing.
- The users should consider the climatic conditions and crop stage before applying any weed management practices
- Weed management options in common bean production were summarized as indicated in table 7 and 8 below.

Critical weed-free period

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- This period depends upon the competitiveness of the variety and its spacing.
- The users should consider the climatic conditions and crop stage before applying any weed management practices
- Weed management options in common bean production were summarized as indicated in table 7 and 8 below.

Table 5 Weed management options of common bean

WEED MANAGEMENT OPTIONS	RECOMMENDED PRACTICES	REMARKS
Preventive	1. Use clean and weed-free crop seeds. 2. Use clean farm implements. 3. Use a clean threshing area.	
Cultural control	1. Crop rotation, 2. Proper field preparation, 3. Use of cover crops, mulching, 4. Water management, and 5. Hand or mechanical weeding	1. The first weeding needs to be done 2-3 weeks after planting. 2. The second weeding should be done before flowering at about 4 to 6 weeks after planting.
Chemical control	1. Preemergence and post emergence herbicides 2. S-metolachlor, pendimethalin, atrazine	1. Use only nationally registered chemicals, 2. All appropriate safety measures and precautions must be taken.
IPM	1. Pre-emergence herbicide with well-prepared seedbed, 2. Supplementary hand weeding	

Table 6: Common herbicides used to control weeds of common bean

BRAND OR COMMON NAME	NAME OF ACTIVE INGREDIENT	USE RATE (L/HA)	TIME OF APPLICATION	FOR WHICH TYPE OF WEEDS
Fusilade	Fluzifop-p -butyl	0.25 kg a.i. ha-1	Pre-Emergence	Grass Weeds
Lasso	Alachlor 480 EC	4 lt/ha	Pre-	Broad Leaf Weeds
Dual Gold	S-metolachlor 960 EC	1 lt/ha	Emergence	Broad Leaf Weeds

Post-assessment questions

1. *Describe the major disease and insect pest causing damage to common bean.*
2. *Describe the different weed controlling methods of common beans.*

Take away message

Appropriate management of common bean pest is critical to fulfill the market demand to enhance profitability

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SECTION 4. COMMON BEAN HARVESTING AND POST-HARVEST HANDLING METHODS

Overview of the section

Harvesting is the process of picking and collecting ripened crops from the farm after it has achieved full physiological maturity. Gains in yields are often offset by postharvest losses from the stage of harvesting until the producer reaches the final consumer or processor. Postharvest losses of beans totaled more than 30% which occurred at the producer, collector, wholesaler, and the retailer levels. Therefore, Postharvest losses of agricultural produce could be reduced by using appropriate technology during harvesting, handling, packaging, transportation, processing, and marketing. In this section, focus is given to the proper harvesting time and processing, and storage management of common beans.

Learning outcomes

At the end of this section male and female participants will be able to:

1. *Describe indicators and the appropriate harvesting time of common bean.*
2. *List the major post-harvest handling processes of common bean*

Duration: 6 hours

Learning question

1. *Explain how farmers in your area know the appropriate harvesting time of common bean.*
2. *Describe some of the post-harvest handling mechanisms for common bean.*

4.1 HARVESTING TIME

1. To ensure quality of the grain bean, harvesting should be carried out on time to avoid losses and deterioration of quality.
2. Bean Harvesting
3. Beans are harvested at different physiological stages depending on the intended use and as per market demand.

- When it is for fresh food, green bean cultivars are harvested in their immature state while their pod diameter is smaller, and their texture is fine.
- For fresh consumption common beans are harvested when the pods tend to be yellow.
- If it is meant for dry grains, the whole plant is harvested when it has dried and achieved full physiological maturity.

Bean physiological maturity is the stage when the crop has achieved maximum growth (usually 70-110 days) after planting depending on the variety grown) and has the following indicators:

- Start harvesting when the leaves and pods are dry and yellow brown in color.
- Bean leaves turn yellowish with mature veins,
- Shading of leaves in some varieties occurs,
- Seed texture hardens,
- Seed color becomes more pronounced,

4.2 PODS HARDEN, BECOME LIGHT BROWN, HARVESTING METHODS

- Harvesting should be started when most of the pods (80 to 90% of pods) begin to dry.
- At harvest, the seed moisture content should not be less than 16%.
- It is advisable to harvest early and make additional drying in a convenient place before threshing.
- Harvesting in the morning is advisable to reduce losses due to shattering of pods.
- Matured beans can be harvested manually/ hand harvesting or by machinery.
- Manual/ Hand harvesting is the most common method in Ethiopia and is considered practicable for crops under small scale production.

Figure 5. Harvesting common bean: manually, with machinery and green pod hand picking

Table 7: Common practices to be done and or avoided during harvesting

'DO' PRACTICE	'DON'T DO' PRACTICES
1. For fresh beans, harvest as pods start yellowing. 2. For dry beans, harvest when pods turn brown. 3. Place the harvested plants on a tarpaulin or mat	1. Harvesting pre- mature/ early harvesting 2. Delayed harvesting leads to shattering 3. Carrying soil on the roots of the harvested beans 4. Leaving the beans to dry in the field

4.3 POST-HARVEST HANDLING

Postharvest handling practices are activities carried out immediately after harvesting and they include transportation, drying, threshing, cleaning, packaging, and storage. Good post-harvest handling practices ensure that the harvested product reaches the consumers in the desired quality and quantity.

Drying beans in the pods

During harvesting the moisture content of grain is between 18-24% and this should be reduced to 14% through drying for safe handling.

- During drying, the following steps should be followed:
- Sort the beans to remove weeds and immature pods.
- Spread the beans loosely on the tarpaulin/ drying sheet, drying rack, drying yard, and mat to allow drying of the pods.
- Dry the beans until the pods can easily open to release the grain.

Threshing of beans

Threshing is the process of separating the bean grain from the pods to make grain available for further processes.

During threshing, the seed moisture content should not exceed 14% to avoid seed/grain breakage.

The popular methods of bean threshing are:

a. Hand threshing: Beans are threshed by gently beating the pods with a stick.
b. Manual bean thresher: Human powered (hands or peddle) machine used for removing grain from the pods,
c. Motorized bean thresher- It is a machine used for removing grain from pods.

Figure 6: Threshing of common bean- with machinery and manually

4.4 DRYING THRESHED GRAIN

- After threshing, the grain needs further drying before safe storage.
- Controlling the moisture content of the dry bean is essential for stability in this storage system.
- The seed moisture content of stored bean seeds should not go above 10%.
- A seed with 10% moisture under a moderate temperature could retain its viability for about three years.
- On the other hand, a seed with 13% moisture under a similar environment can maintain its viability for one year.
- It is important to use chemicals against storage pests whenever there is a need for extended storage.
- The grain can be dried by spreading on a clean tarpaulin, plastic sheets, mats, and drying yards.

Different methods and technologies can dry threshed beans. These methods and technologies are:

1. Sun Drying- Drying is carried out in the open air on tarpaulin, mats, plastic sheets, drying yards, and collapsible dryers. It is the common method in Ethiopia.

2. Mechanical drying- Hot air is blown in the grain to remove excessive moisture under controlled conditions. Hot air is generated using burning fuel, solar, electricity and biomass.

During drying of the grains, take note of the following precautions to ensure quality:

- Turn the grain regularly to hasten and ensure uniformity of drying especially when using sun drying,
- Keep animals off beans to avoid contamination of grain with animal droppings,
- Protect the grain from adverse weather conditions by covering the grain with tarpaulin or keeping it under a well-ventilated facility,
- For mechanical drying, ensure appropriate temperature is maintained through close monitoring of the temperature.
- Ensure close monitoring of the moisture content to ensure that recommended standard is achieved,
- Dry the bean grains until the required moisture content is attained.

4.5 TRANSPORTATION

Beans are transported home for further activities to be carried out. Transportation is carried on pack animals, Cart, head, bicycles, motorcycles, and vehicles depending on the volume of produce. During transporting the grain care should be taken to protect the bean from quality decreasing materials and moisture.

4.6 MOISTURE TESTING

The moisture content of grain beans can be measured by using the traditional method and scientific method.

Traditional methods:

3. Shaking grains in a tin and judging from the sound made: grain with high MC gives a dull sound compared to the sharp sound made by dry grain.
4. Pushing the hand into grain bulk: wet grain offers more resistance to penetration than dry grain. In addition, grain with high moisture content has high temperatures in the middle due to high metabolic rate while grain with optimum moisture content is cold in the middle.
5. Biting with teeth: a dry bean is relatively hard and cracks when you bite with teeth while grain with high moisture content is soft, the teeth penetrate when you try to bite,
6. Scientific method. The scientific method of measuring moisture content of grains is done by using Moisture meter. Moisture meter is the equipment used for measuring moisture content in grain. It measures the percentage moisture content in each sample.

4.7 GRAIN BEAN CLEANING

Cleaning is the removal of foreign material and non-conforming beans from the normal ones. Several technologies are employed to clean the grain, and they include traditional winnower and mechanical cleaners (human and motor operated).

1. *Traditional winnower- Common at smallholder farmer level. One person can clean 100 kgs per hour.*

Figure 7: Traditional winnowing

2. *Use of screen/sieve- This method is common at bulking sites and warehouses. It is more efficient than using a traditional winnower. Foreign materials and dirt that are smaller than the screen size pass through.*

Figure 8: Manual screen/sieve

3. *Mechanical cleaners- These are machines that are operated by engines or mortars and have the capacity to clean above one ton/ hour with an automated sorting system based on the quality parameters like color, size, and shape. They are appropriate for big companies, bulking centers, and warehouses where big volumes of grain are being handled.*

Figure 9: Mechanical bean cleaner

4.8 SEED/GRAIN TREATMENT GRAIN/SEED TREATMENT

- Seed treatment is the application of nutritional seed supplements biological organisms, or physical processes to seeds to improve their performance
- Seed treatments aim to enhance seed vigor, ensure healthy seedling growth, and protect them from pathogens and pests.
- Seed Treatment is critical to modern agriculture and helps farmers optimize their yields and maintain high-quality crops.
- If you apply chemicals to grain before storage, do not eat or sell the grain until it is safe for consumption

4.8.1 BENEFITS OF SEE/GRAIN TREATMENT

improve disease resistance with fungicides

Protection Against Pests and Insects

Increased Tolerance to Environmental Stresses with Seed Priming Techniques

4.8.2 COMMON METHODS OF SEED TREATMENT

Seed Coating: the process of enveloping seeds with a thin layer of materials like polymers, fertilizers, or growth promoters

Seed Dressing: Seed dressing protects seeds from pests and diseases during the early stages of growth

Seed Pelleting: can lead to better crop stands and easier weed management

Seed Priming: a pre-sowing strategy that prepares seeds for germination)

Seed Disinfection: is crucial for disease prevention, ensuring that seeds are free from harmful microbes that can jeopardize the entire crop2.8.3. Types of seed treatment

TYPES	ADVANTAGES
Fungicides application	1. Protect seeds against a wide range of fungal diseases that can inhibit germination or harm young plants 2. Inhibiting fungal enzyme activity or disrupting critical life cycle stages of the fungi.
Insecticides	1. Shield young plants from various pests, such as aphids, cutworms, and beetles 2. Repel, kill, or inhibit pest growth, ensuring a pest-free environment during critical early growth stages.
Bio pesticides	1. Environmentally friendly approach to pest and disease management 2. They often target specific pests, reducing the chances of resistance,
Nematicides	1. Combat these microscopic worms, ensuring a healthy root system, and in turn, robust plant growth
Plant Growth regulators:	1. They can enhance seed germination, root development, and overall crop yield.
Micronutrients	1. They play crucial roles in enzymatic reactions, chlorophyll production, and overall plant metabolism. 2. These essential trace elements can ensure robust, healthy plant growth from the outset.

4.9. CLEANED GRAIN BEAN STORAGE

- Clean the storage room. Stack the grain bags on a raised platform or wooden pallet away from the wall.
- Avoid direct contact of storage bags with the ground.
- Inspect and remove infested or rotting grains on a regular basis.
- Storage is the process of keeping grain until an appropriate time of use.
- The primary aim of storage is for quality maintenance, food & nutrition security, seed, and better price.
- On-farm storage in small bins is common; however, based on the volume of the grain beans can be stored using different storage materials.
- Various storage technologies (traditional and modern) can be used by smallholder farmers to store bean grain, and these include:

A. Traditional technologies: Mud and wattle granaries, Baskets, Pots, Jute bags, wood cribs, concrete silos, etc.

B. Modern storage technologies: hermetic bags, PVC Tanks/ Silos, Metallic tanks/ Silos, Cocoons, Triple/ Pics bags, Flatbed Warehouse/Silo, Grain store (Farm level), etc.

Figure 10: Metal silos

Hermetic storage: is an airtight facility that allows for maximum protection of stored products from insect infestation. It seals off the exchange of oxygen and moisture between the produce and the environment. Advantages of hermetic storage include eliminating the use of chemicals in controlling storage pests, beans can be stored safely for more than 12 months, stores seed without losing seed viability, simple to use, affordable by small holder farmers.

Figure 11: PICS Bags

4.9.1 STORAGE MANAGEMENT:

- Proper storage of a dried and cleaner is an essential requirement to prolong the life of the grain by keeping its market qualities to fulfil the requirement.
- Care should be taken starting the reception of the grain to transport the grain to market.
- The storage process and management of common beans and involves the following steps indicated in the diagram.

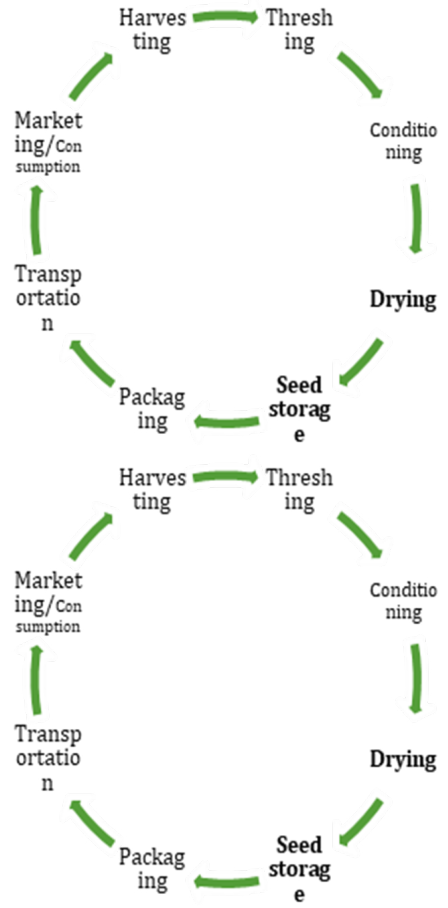


Figure 12: Steps of harvesting & post-harvest handling, and storage of common bean

- Where hermetic grain storage tank/bag has been used, it should be placed on pallets/ dunnage poles/ wooden platform.
- Stacks should be placed by crossing the layers to increase stability. Organize the produce in a well-defined pattern to ensure safety, easy stock taking, and air flow as indicated in the layout below. Note: bags of the same weight and shape should be stacked together

4.10 GENERAL HYGIENE PRACTICES OF STORED BEANS

- The following issues should be properly handled to have a safe storage condition
- The store should be cleaned thoroughly before and after storage of produce,
- The floor, walls and roof should be cleaned regularly to remove the dust, cobwebs, and any other dirt,
- During cleaning, the stacks should be covered with tarpaulins or canvas to avoid contamination,
- Clean the surrounding of the storage facility to avoid inhabiting rodents and other insects,
- Ensure that the store is closed all the time and is open as and when required,
- Ventilators and other outlets should have screens that prevent rodents, birds and insects from entering the store,
- Nonfood materials and chemicals must not be kept in grain stores. They should be kept in separate nonfood stores.
- Avoid fire in the storage area.

Good storage practices: It is important to inspect the internal and external areas of the store.

- Regularly, check the store for signs of water leakage, floor cracks and crevices, signs of damage on bags (rodent or insect), leakage of grain on the floor, presence of live insects and any signs of contamination.
- Always inspect the surrounding environment to ensure hygiene,
- Carry out fumigation to control storage insect infestation (Use licensed and professional fumigator)
- Ensure first in first out (FIFO) rule when handling stock in storage.

Storage infrastructure design and maintenance

The following should be taken into consideration to ensure good conditions of bean grain storage:

- The roof should be leaking proof,
- The floor should be impermeable and easy to clean,
- The walls should be easy to clean,
- There should be enough ventilation for easy

flow of air to remove disorders that may develop during storage and cool the stored bean grain/ produce (Note: Fans, cyclones and transparent sheets are not recommended on grain storage structures).

4.11 GOOD AGRICULTURAL PRACTICE CERTIFICATION

- Exporting common beans in grain and in pods to the international market is facing critical challenges.
- These concerns include the excessive presence of pesticide residues, issues related to storage and transportation, disease and pest management and hygiene practices.
- These factors are collectively diminishing the competitiveness of countries in the global market, whilst hindering farmers' and agribusinesses' ability to achieve premium prices for products due to their restriction to less profitable, regional markets.
- The aim is to provide confidence that produce grown by certified farms is safe to eat, socially and environmentally safe.
- Fulfilling the minimum standards of the international market. This certification is a globally recognized standard for agricultural production, covering a wide range of criteria, from crop management to product traceability.
- The Global Good Agricultural practices helping get certification for exporting beans include environmental, economic and social sustainability for farm processes, and result in safe and quality food and non-food agricultural products.
- The standards consider which varieties or planting material used, the cultivation process, fertilization, irrigation, etc.

Post assessment questions

- *How do you know that common bean is ready for harvesting?*
- *Lists common practices of post-harvest practices of common bean*
- *Why understanding moisture content of the grain is important in pre-harvesting and post harvesting time?*

Take away message

Harvesting common bean in the proper harvesting time, safe storage and reducing losses of the grain helps

SECTION 5. VALUE ADDITION OF COMMON BEAN

Overview

Agricultural marketing covers the services involved in moving an agricultural product from the farm to the consumer. Agricultural marketing can be defined as a process which starts with a decision to produce a saleable farm commodity, involves all the aspects of market structure or system, both financial and institutional, based on technical and economic considerations, and includes pre- and post-harvest operations, assembling, grading, storage, transportation, and distribution.

The marketing system should be such that it may bring about the overall welfare to all the segments (producers, consumers, middlemen, and traders) of society. These services involve the planning, organizing, directing, and handling of agricultural produce in such a way as to satisfy farmers, intermediaries, and consumers.

After harvest, to enhance the marketing and food value, beans are cleaned and then processed into final consumer products or ingredients. Products such as packaged dry beans, canned beans, baked beans, bean

pastes, puffed snacks, texturized vegetable protein as meat analogues, cereal products, soups, frozen beans, and bean flours all result from processing.

Therefore, this section mainly focuses on effective value addition methods and marketing of the bean grain that makes the common bean producer profitable, make their business sustainable and establish a sound & consistent market linkage.

Learning outcomes

At the end of this section male and female participants will be able to:

1. *Describe the different primary and secondary value addition practices of common bean grain.*
2. *List the major market actors and opportunities of common bean production.*

Learning question

1. *Describe the different value addition practices of common bean.*
2. *Describe the major market actors for common bean and their role.*
3. *Describe the major challenges of common bean marketing.*

5.1 VALUE ADDITION OF COMMON BEAN

- Value addition is important because of the following: high market prices, extended shelf life, and diversified grain products hence alternative sources of incomes.
- Urban and peri-urban consumption of beans and bean products has the potential to enhance marketing of beans for increased household income and improved health status.
- Processed beans are bean products created from dried beans.
- Secondary value-addition of beans at industrial level can enhance both household income and nutrition.
- Primary value addition can take several forms such as drying, threshing, cleaning, sorting, milling, and packaging, and branding depending on the level of the value chain

Primary value addition

Primary value addition in common beans include practices used to make the grain free from foreign materials, uniform color and size that improve the value of the grain.

a. Cleaning & sorting

- Following harvest, beans must pass screening and sorting process to get a grain with uniform size, color, and type.
- During cleaning beans materials lighter-than-bean, such as stems, leaves, pods, checked seed coats, shriveled seeds, hollow seeds and other forms of trash and plant material will be removed and improve the quality of the grain.
- Bean size separation is achieved by screening over a series of sieves by using manual operating sieves and provides increased uniformity of size and shape.
- Screening beans by size and weight will result in uniform grain having better market demand.

b. Packaging and market distribution

- Beans, if not packaged and stored properly, are subject to harmful microorganisms, insects, and extraneous contamination,
- Packaging is essential for preservation and serves the vital role of allowing food products to be safely distributed throughout all phases of value-chain.
- Dry beans are sold at local, regional, and international markets. The local market is comprised of individuals, institutions (schools, hospitals, prisons, army), relief organizations, processors, and traders.
- Dry bean packaging is an important component of a complete system, providing the high level of food safety, quality, and nutrition,
- Dry edible beans are packaged in food grade impervious materials to ensure that the integrity of the package allows for minimum subsequent contamination of the product.
- The common method of handling dry

beans was by bags made from fiber jute; due to the supply and quality problem this practice has been largely reduced and replaced with alternate materials including laminated paper and polypropylene.

Figure 13. Clean and sorted uniform common bean pod and grain

5.1.2 PRIMARY VALUE ADDITION

- Packaging is an important component of a complete system, providing a high level of food safety, quality, and nutrition,
- Products such as packaged dry beans, canned beans, baked beans, bean pastes, cereal products, soups, and bean flours, etc. are secondary value addition products.
- Dried grain can be either soaked and cooked, or ground into flour and the flour may be combined with cereal flour to increase its protein content and then baked or fried.
- Milling: Beans to a lesser extent can be milled to produce value-added bean products such as bean-based flour, bean cookies and snacks.
- Canned beans: Beans are further processed by cooking through steaming and packed in tins. Canning is one of the most common forms of bean processing. Canned beans are a convenient alternative to dry beans which require long cooking times.

Post assessment questions

1. *What are the major common bean value addition practices that enhance the market price of the produce?*
2. *Which method is usually practiced in your area?*

Take away message

Primary and secondary value addition practices potentially enhance diversified incomes for agri-entrepreneur

SECTION 6. FINANCIAL FEASIBILITY

6.1 OVERVIEW OF FINANCIAL FEASIBILITY

Financial feasibility describes whether agri-business is financially viable. It involves determining initial investment (resource) requirements to start the business, estimating production cost, operation expenses, and sales revenue. These are used to determine the initial investment requirement, profitability of the business, break-even point (minimum level of production) to attain the profit zone, and pay-back period (number of years required to recover initial investment). These series procedures are used to make wise decisions to accept or reject the agribusiness investment alternative.

Learning outcomes

To equip trainees on Key procedure to follow for effective marketing in agri-business.

Duration: 2 hours

6.2 INITIAL INVESTMENT

1. Initial investment is the minimum capital requirement to start the business.

2. Example of initial investment requirement to start seed production business includes tools and equipment, seed storage, land, tractor, working capital, etc.

Table 8: Template to estimate initial investment requirement for agri-business.

DESCRIPTION	TOTAL COST	REMARK

Long-term investment

Long-term investment in agri-business involves all asset requirements for the business which can serve for more than one year.

- Example tools and equipment, tractor, storage, land, etc.

Table 9: Template to calculate total cost for acquisition of long-term investment

TYPES OF INVESTMENT	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST

6.2.1 WORKING CAPITAL

Working capital for the planned agri-business includes all payments requirement for day-to-day operating activities such as production costs and operating expenses.

Example

1. *Production costs include the cost of seed, fertilizer, chemical, labor cost etc.*
2. *Operating expenses include administrative salary, sales commission, promotion, etc.*

Working capital excludes long term investments such as warehouses, tools and equipment, land, tractor, etc.

a. Production cost

Production costs are a key component in agri-business.

It includes all costs associated with production including value in addition to making the product ready for sale.

Table 10: Template for estimating production cost per hectare for onion seed production

TYPE OF COSTS	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST
Total				

Operating expenses

Operating expenses are all costs not directly associated with production.

They are common costs incurred for administrative and selling activities.

Example administrative salary, promotion cost, sales commission, transport cost to sale,

Table 11: Template to estimate operating expenses for agri-business

TYPES OF COSTS	TOTAL COSTS

6.3 ESTIMATED PRODUCTION AND SALE REVENUE

1. Production volume is the main source of revenue for the agri-business to generate profit.
2. Producers should determine the estimated average production volume from the planned production season.
3. After determining the estimated volume of production, it is possible to determine the expected sales revenue for the planned production.

FORMULA 1
Tt production volume = Average Production per hectare X Land size (ha)

FORMULA 2
Total sales revenue = Total production volume X unit selling price

A	B	C	D	E	F
TYPES OF PRODUCTS	LAND SIZE (HA)	ESTIMATED PRODUCTION/ HA	TOTAL PRODUCTION (B X C)	ESTIMATED SELLING PRICE/ UNIT	TOTAL SALES REVENUE (F X G)

6.4 PROFIT AND LOSS STATEMENT

1. The primary objective of any business is to generate profit.
2. Profit and loss statement is the main tool to calculate profitability of the business.
3. It is used to accept or reject the investment based on estimated profit.

FORMULA 3
a. Gross profit = Total sales revenue – Cost of goods sold
b. Net profit = Gross profit – Total operating expenses

Table 13: Template for profit and loss statement preparation

DESCRIPTION		
Sales Revenue		
Cost of production (-)		
Gross profit		
Operating Expenses (-)		
Net profit		

6.5 BALANCE SHEET

Balance sheet used to know the total resource owned, amount of claim by creditors and amount of owners' equity

1. Balance sheet contains assets, liability, and own capital
2. Assets are all resources available for use or for sale

Example cash, inventory, warehouse, land, equipment etc.

3. Liabilities are all debts obtained from banks, microfinances, individuals or others
4. Own equity/capital involves own/member contribution, grant/donation, etc.

FORMULA 4
Total Asset = Total liability + Total own capital

Table 14: Template for balance sheet preparation

DESCRIPTION		
Asset		
Current asset		
Cash		
Inventory		
Total current asset		
Fixed asset		
Tools and equipment		
Warehouse		
etc		
Total fixed asset		
Total asset		
Liability and Capital		
Liability		
Loan		
Total liability		
Owners' capital		
Own capital contribution		
Grant/donation		
Total owners' capital		
Total liability and capital		

6.6 CASH FLOW STATEMENT.

Cash flow is all cash inflow and outflow for any purpose in the business operation

Example:

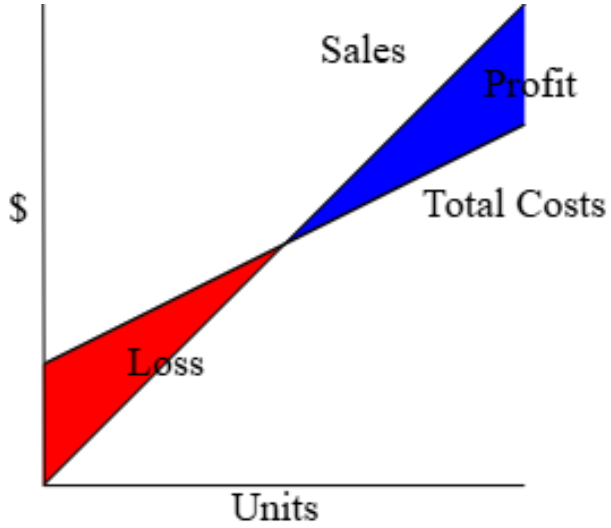
Cash inflows include sale of seed/seedling, debt obtained from banks, members capital contribution, etc

Cash out flow includes purchase of input, payment for construction, repayment of debt, payment for salary, etc.

FORMULA 5
TBeginning cash balance + total cash inflow = ending cash balance + total cash out flow

Table 15: Template for cash flow statement preparation

DESCRIPTION	AMOUNT OF OUTFLOW	AMOUNT OF INFLOW
Owners' investment		
Debt		
Grant		
Sales revenue		
Wate house construction cost		
Purchase of equipment		
Purchase of input		
Land rent		
Irrigation cost		
Labor cost		
Cash Operating costs		
Ending cash balance		
Total		



6.7 BREAK EVEN ANALYSIS

1. Break even analysis is used to determine the minimum level of production to cover total cost
2. At break-even point no profit no loss
3. To make profit, the level of production and sale should exceed/greater than breakeven point.
4. Fixed costs are fixed in total amount regardless of increase/decrease in volume of production.

Example depreciation, warehouse rent, administrative salary, promotion cost, etc.

5. Variable costs varied in total in response to increase/decrease in level of production
6. Example production costs, packaging cost, loading and unloading.

FORMULA 6
Break-even point = Fixed cost/(Unit selling price – unit Variable cost)

6.8 PAYBACK PERIOD

Payback period is used to determine the number of years/periods it takes to recover initial investment.

Payback Period

The amount of time it takes to recover the cost of an investment.

Formula -3

a. *When the annual profit of the business is uniform/equal*

Payback period = Initial investment/annual profit

b. *When the annual profit fluctuate/vary from year to year*

Payback period = # of year before coverage + uncovered amount/profit of the next year

Post assessment questions

1. Which of the following is part of working capital
a. *Purchase of fertilizer*
b. *Purchase of tractor*
c. *Transportation cost*
d. *purchase of chemical*

2. Which of the following should include in profit/loss statement
a. *Purchase of tools and equipment*
b. *Sales revenue*
c. *Debt*
d. *Owner investment*

Key message

Analyzing financial feasibility of agribusiness enables to pre-determine the applicability of the business in terms of initial investment.

Analyzing financial

RISK AND MITIGATION MESURES

RISKS	MITIGATION MEASURES
Limited demand driven input/early generation seed supply	Create strong, sustainable, and diversified linkage with suppliers through contractual based early generation seed production, and last mile input delivery systems
Climate change	Use climate adoptive crop varieties, use irrigation scheme, use climate prediction information and tends of climate change, use diversification, understand effective crop Calander
Inflation/market fluctuation	Conduct effective demand assessment, understand competition in the business, apply cost-based pricing strategy, understand the market trend, use diversified market outlets
Limited access to finance	Create strong linkage with diversified sources of finance such as banks, microfinance, use family/friends/partner, develop saving,
Insects and disease	Use quality and certified seed, apply crop rotation, understand the type of the insects/disease and use chemicals/manual mitigation method
Security	

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