
Review Article

Assessments of Coffee Seedlings and Seed Production Challenges and Opportunity in Jimma Zone South West Ethiopia

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Abstract: The most important agricultural product is coffee seed production, which requires a lot of labor and time. Coffee seed production is essential to the economies of over 70 countries and is the main source of income for millions of people worldwide. Despite Ethiopia having the largest share of production and economic output, the value of coffee exported from Africa, and particularly Ethiopia, has dropped over time due to a lack of sustainability and low competitiveness of the sub-sector at the national and international market. Coffee, which makes up the lion's share of Ethiopia's total economic production, has been and continues to be the country's main source of foreign exchange revenues. Despite its significance, the coffee industry encounters a number of challenges in Jimma zone south west Ethiopia, including:- high cost of production of seed and seedlings, low productivity and disease. Quality seed distributors, cost of farm tools, cost of inputs, lack of processing tools, the cost, and availability of other inputs, cash constraints, weather predictions, and the cycle of seeder placement times; The agricultural crew's skills should be improved, strengthening the skills of agricultural workers at all levels, particularly DAs, seed producers. This assessment paper is therefore an attempt to share experiences on the current status of coffee seed and seedlings production cost system. It also presents the challenges, opportunities and future directions for effective and efficient coffee seed and seedlings systems in Jimma zone.

Keywords: Coffee Seed, Cost of Production Challenge's, Seedlings

1. Introduction

1.1. Background

Ethiopia is the third-biggest Arabica coffee grower in the world and, as of 2022, Africa's greatest coffee producer. Around the previous ten years, production has gradually increased from 6 million to around 8.15 million bags. Ethiopia also made the first Arabica coffee in history. If the weather is good, there are few insects and diseases, and there is enough rainfall, coffee production is predicted to rise by 100,000 bags to 8.25 million bags (495,000 tons) in 2022–2023. [1] Compared to the 2019/20 predictions of 7.6 million bags, the coffee output estimate for 2020/21 was increased to 8.15 million bags.

For agricultural development to be successful, especially in

an agrarian economy like Ethiopia's, it is imperative that new technologies be created and transferred. [2] Even though various enhanced crop types have been made available, most farmers have only sometimes used better seeds [4].

In Ethiopia, coffee is the principal export good. The country imports profitable items using the currency. [3] Due to this, Ethiopian exporters used to offer their coffee for such low prices.

According to Davis Ethiopia's primary coffee-growing regions are Oromia and South Nation, Nationalities and Peoples Regional State (which at the time included the Sidama Region) [3]. Amhara and Benishangul Gumuz regions produce less coffee than these two main regions.

According to David and Sperling (1999; Rubyogo et al., 2010) [4, 10], the private sector focuses mostly on generating

seeds of hybrid kinds that are challenging for farmers to prevent from being harvested. Furthermore, government organizations lack the ability to produce enough seed. [5, 12] It is commonly acknowledged that the informal sector plays an important part in the distribution and production of seeds.

The informal sector distributes seed in a variety of methods, including gift-giving, cash sales, labor-for-seed exchanges, and presents.

Coffee is propagated by seeds, and a number of factors, including as the particular seedling production method, container substrate, and seed quality used to create coffee seedling and/or growing in the field. It can be difficult for many native species' seeds to germinate. [6, 13]

Today, the coffee production method has changed from a traditional system to a plantation system due to the intense rivalry in the global coffee market and the consequences of climate change. Since producing high-quality coffee in home gardens and plantation systems is the producers' top priority since the best quality enables them to charge more [11].

The coffee industry in Ethiopia offers promising futures. The nation has a good altitude, a good climate, enough labor, and fertile soil. With the ability to create all coffee varieties from the many coffee-growing regions throughout the world, it can sustainably produce and supply exquisite specialty coffee. Other opportunities for coffee production in Ethiopia include the significant demand for the commodity both domestically and abroad, growing private sector interest with great investment potential, and strong federal and regional support. The most significant export good for Ethiopia is coffee, which serves as the foundation of its economy. Ethiopia exported coffee worth a record-breaking over 917 million US dollars during the 2017–18 marketing year alone.

In Ethiopia, 856,591.99 ha of land had been set aside for coffee cultivation, and in the 2020/21 Meher Season, 5,847,895.69 tons of coffee was harvested there with an average yield of only 0.68 tons per hectare, which is significantly lower than the global average. [7, 9] Different physical, biological, and man-made causes may be to blame for this, one of which is the farmers' lack of access to high-yielding varieties. Additionally, biological and institutional elements are more important in the manufacturing of coffee. The main obstacles to producing coffee were diseases, insect pests, poor access to market information, a lack of physical infrastructure, a lack of improved coffee varieties, and subpar extension services. [8, 14]

1.2. Objective

1. To review and identifies the main difficult areas of the Coffee seedlings and seed production cost and marketing in Jimma south west Ethiopia.
2. To show Coffee seedlings and seed production, distribution channels' in Jimma south west Ethiopia.
3. To isolates Challenges, Opportunity and Future Perspective of Coffee seedlings and seed production in south west Ethiopia.

Description of the Study Area

Jimma Zone is divided in to 13 weredas (hosting a total population of over 2.2 million) with an agro-ecological setting

of highlands (15%), midlands (67%) and lowlands (18%). The zone is one of the major coffee growing areas of Oromia region well-endowed with natural resources contributing significantly to the national economy of the country. Major crops grown, other than coffee, are maize, teff, sorghum, barley, pulses (beans and peas), root crops (enset-false banana and potato) and fruits. Teff and honey production are another sources of cash after coffee. Enset is a strategic crop substantially contributing to the food security of the zone and is especially important in Setema and Sigimo weredas (highlands).

Jimma Zone reliably receives good rains, ranging from 1,200 - 2,800 mm per annum. In normal years, the rainy season extends from February to October. For the last four years, however, various adverse conditions have threatened the food security of the zone. In 1996/97, poor coffee harvests and low market prices decimated the income of coffee growers. Excessive rains and hailstorms at harvest time (October, November and December) in 1998 stripped grains from the stalk and induced germination in the field affecting the quality of harvest both for food and for seeds.

1.3. Significance of the Review

The assessment provides details on the costs associated with producing coffee seedlings and seeds as well as challenges, opportunities, and future outcomes in Jimma Zone Ethiopia. Women's, youth, and investors markets can use the information to better understand. Numerous entities, including national research institutes, development organizations, dealers, producers, policy makers, extension service providers, government and non-governmental organizations, can benefit from the information collected by this review.

2. Discussion

Definition of Terms

Cost of production in agriculture Also known as production expenses or cost price, cost of production is a general term. It is the overall expense incurred by a corporation to create a particular quantity of a product. Include a variety of costs, including labor, raw materials, consumable manufacturing supplies, and general overhead. Include all direct and indirect costs associated with producing the product.

Agricultural marketing features the terms marketing and agricultural. Agriculture generally refers to the raising and/or growing of plants and animals, whereas marketing refers to the actions involved in getting products from the point of production to the point of consumption. A coffee seed sector The lack of knowledge among the great majority of smallholder farmers about the types they grow in their fields and how to get access to better-suited plants for their environment to boost their profitability is a big concern for the coffee industry's seed business.

Planting Rather than being beans, coffee is a seed. The only way to utilize them to make the simple zip is after they have been dried, roasted, and ground. Coffee plants can be produced from unprocessed coffee seeds if they are planted. In vast, shaded beds, the seeds are typically planted. The

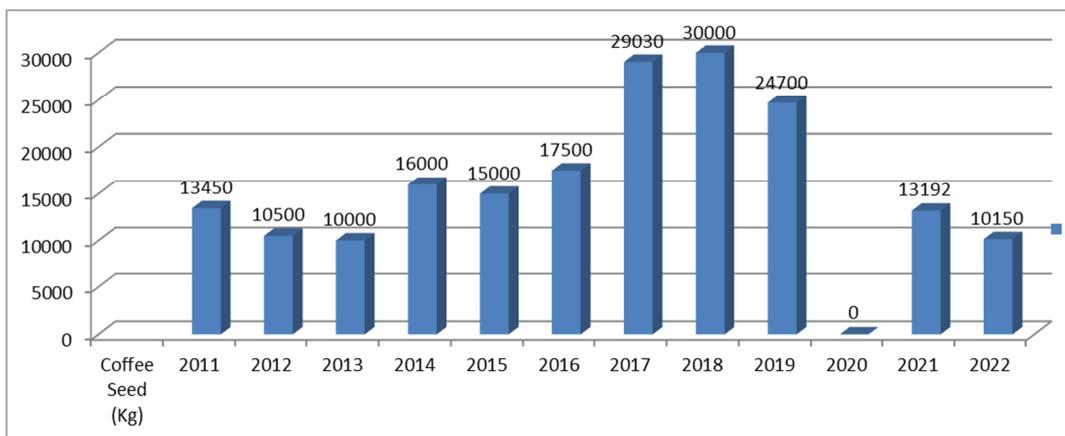
immature seedlings are placed in individual pots with specially prepared soils for best growth after sprouting and are then given a few days to develop. Until they are strong enough to be moved to their permanent growing location, the potted seedlings are kept out of the hot sun and given frequent waterings. For the soil to stay moist while the roots get well-established, planting is best done during the wet season.

Harvesting The time it takes for newly planted coffee bushes to bear fruit varies depending on the cultivar and is usually between 3 and 4 years. The fruit, often known as cherries, changes from green to bright or dark red depending on its level of ripeness; the unripe ones are still green. When temperatures are higher and lower, cherries ripen more quickly. To ensure that only the ripe cherries are selected, coffee can be hand-harvested by individuals. Hand-picking

cherry requires meticulous inspection for ripeness, which is a laborious and time-consuming process that, of course, requires payment of the pickers. Up to three pickings are required to completely empty a farm since cherries mature at various times. cherries are produced on big farms in nations like Brazil where the terrain is flat and coffee is grown on large farms, cherries are machine harvested. Whether by machines or humans, coffee is always harvested by one of the following two methods:

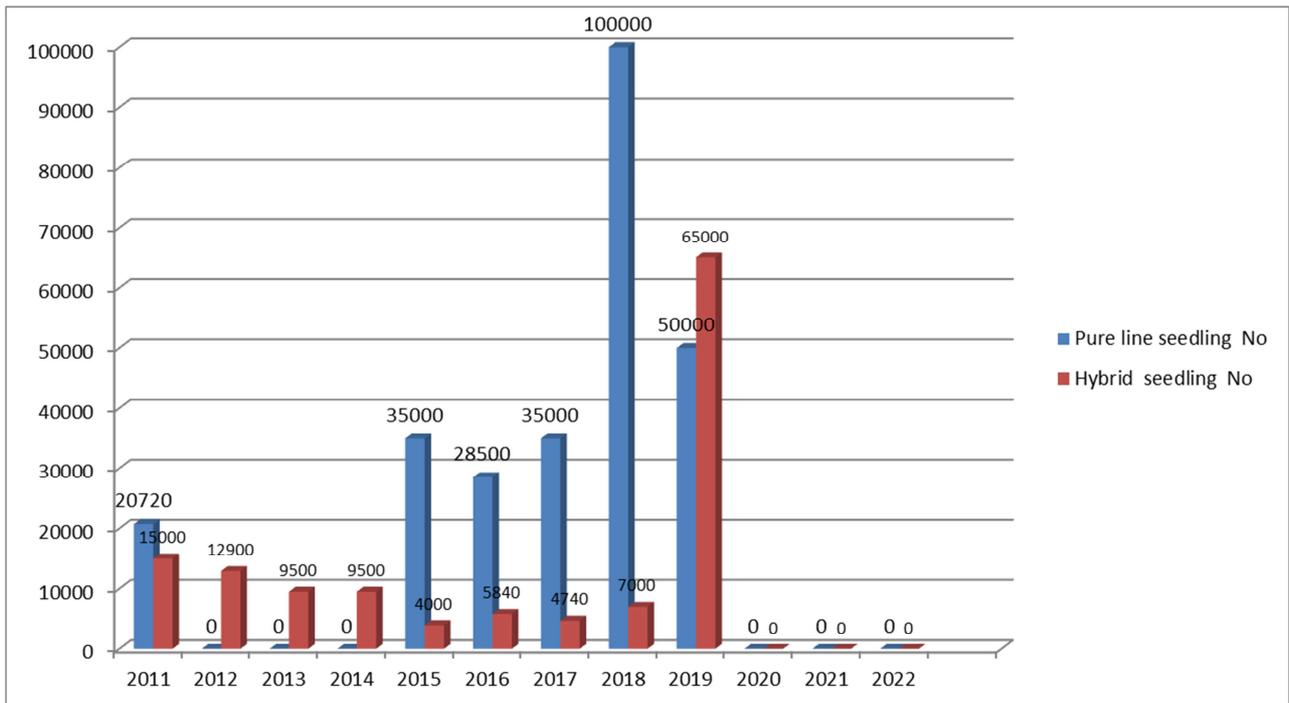
Strip picking – The cherries are stripped off of the branch, either by hand or by machine.

Selective picking – The red cherries are picked and the green ones are left to ripen. Picking is carried out at 10 day intervals. Since this method is labor intensive, it is mainly used to harvest the high quality coffee.



Sources: JARC progress reports 2021

Figure 1. Coffee Seed and Seedlings Distributed and Channels of Distribution from Jimma Research Center (2011-2022 Eco).



Sources JARC progress reports 2021

Figure 2. Coffee pure line seedlings and Hybrid seedlings distributed from Jimma Agricultural Research Center (2011-2022 Eco).

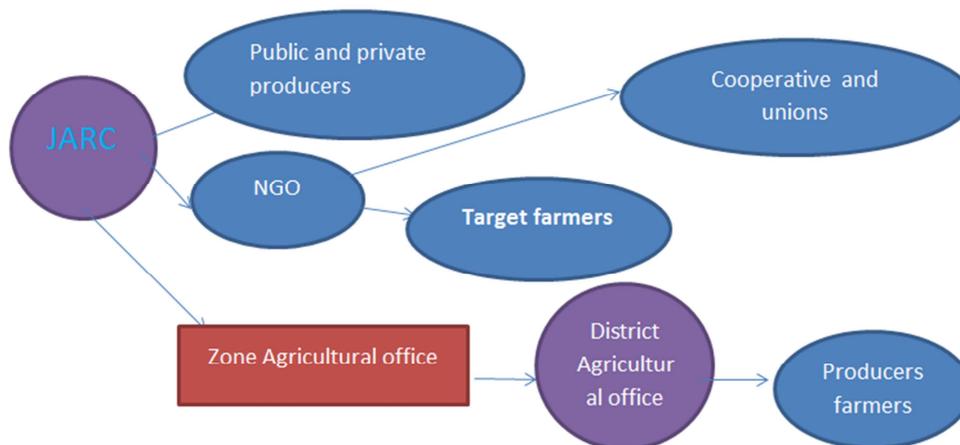


Figure 3. Coffee Seed distribution chain.

3. Coffee Seedlings and Seed Production Cost Challenge Opportunities in Jimma Zone

Productions

The development and distribution of improved coffee seeds generated from the released and adaptable coffee types is not institutionally supported in Ethiopia. Because the Jimma Agricultural Research Center is neither a public nor a private company, it has been and continues to be subject to all of the pressures. As a result, Jimma Agricultural Research Center is the only government organization that has taken the initiative to multiply improved coffee seeds and seedlings of the officially released,

Disease-resistant coffee berry varieties since 1987 and distribute them throughout the primary coffee-growing regions of the country.

The average national output of coffee is subpar by international standards, notwithstanding the wealth of ecological diversity and coffee varieties. This may be caused by a variety of factors, including insufficient credit and input distribution systems for coffee-producing farmers, the dominance of traditional husbandry and processing techniques, and the use of unimproved local coffee landraces, all of which seriously reduce the productivity of the nation's smallholder coffee farmers.

Therefore, it is necessary to promote the best coffee technology in every region and production facility. This calls for a number of initiatives, including vigorously distributing top-notch coffee varieties, enhancing agronomic practices, and creating technology for harvesting and post-harvest management.

Ethiopia has greatly benefited from the encouraging premium coffee prices, in large part because of the current government's encouragement of the production and export of high-quality, market-oriented coffees, among other factors.

The greatest prices for compact coffee kinds could be attributed to increased demand, especially from the Illuababora zones where these coffee varieties are most

productive and have been harvested. However, some of the most recent coffee varieties are not as popular, and further research is required to learn about their shortcomings. Production of coffee seeds and seedlings involves large financial outlays and labor-intensive procedures. Weed control (weeding and digging), grading, and harvesting are particularly expensive and capital-intensive. These practices are frequently carried out every year, and the minimum pay in coffee-growing regions is rather high compared to other agricultural practices that generate grain crops. It is depressing that coffee has such a high labor and capital requirement. There is little doubt that technology developments may dramatically lower production costs while also improving other areas like quality improvement and coffee tree management. However, technical developments require spending in order to maintain an adequate research and extension institution.

4. Major Operation of Modern Coffee Nursery Accomplishments for the Coffee Seedlings Production

1. Land and nursery clearing and digging,
2. weeding to collect forest soil,
3. Transporting soil, sand and compost to nursery,
4. Compost preparation, mixing and sieving,
5. Soil sand and compost,
6. Seed bed preparation Vetiver grass cutting and Shade construction,
7. Cutting, Filling, and Put the filled polythen bag on the seed bed,
8. Watering and sowing seed,
9. Removing mulch and,
10. Re-arrange seedlings on seed bed,
11. Removing mulch and Fertilizer application,
12. Guarding nursery site, Supervision (farm manager).

4.1. Major Operation of Modern Coffee Nursery Accomplishments for the Coffee Seed Production

1. Site selection and field layout,

2. Peg preparation, Hole digging and refilling,
3. Land clearing, Slashing, and weeding,
4. Hat construction and installation,
5. Seedling plantation and transporting seedlings,
6. Shade tree plantation and managements,
7. Fertilizer application, Watering, Guarding,
8. Mulch preparation transporting and mulching,
9. RE-planting coffee seedlings and Planting shade tree,
10. Digging around coffee seedlings and Cultivating,
11. Herbicide and Fertilizer application, Pruning,
12. cost of coffee picking,
13. Storage,
14. Supervisory.

4.2. Challenges of Seedlings and Seed Production Jimma Zone South West Ethiopia

Disease and pest

Replacements of their coffee farm with *Khat edulis* which is not affected by disease and highly drought resistance than coffee.

Lack of either governmental or private seed producers that can distribute seed open the door of awareness.

There is limited understanding amongst stakeholders on the importance of seed production seed multiplication business.

Seed producers may be trained but it is difficult in most cases to implement the techniques.

Some producers do not yet appreciate the importance of seed certification and quality control and therefore quite reluctant to incur cost of seed certification.

Lack of postharvest handling experiences (especially at peak harvest, storage and handling of the seed).

Lack of market for seed: even though the cooperatives are not in a position to produce more than enough.

Seed beyond the capacity of the area but the preparation for market linkage is very low.

Limited number of seed researchers engaged in improvement of varieties;

Shortage of facilities like field vehicle.

inspections, seed sampling and seed monitoring for quality control and therefore reliable transport is required for some of the areas;

Expectation of farmers for free inputs and DLS construction materials.

Scattered fields are a major challenge faced in seed multiplication. This makes field inspection expensive and time consuming.

4.3. Opportunities of Seed and Seedlings Production

The cost of crop products rises in proportion to the zone's population growth. Therefore, to meet the demand for various commodities, farmers require enhanced varieties. Because of the rising market demand for enhanced varieties, farmers are now producing more improved seed.

Fertile ground and an ideally suited environment:

Demand for high-quality seed is rising as farmers' interest in our zone and region grows.

Use enhanced varieties sometimes. The ability to sell their improved cultivars is thus advantageous to seed producers.

Water is also an alternative for seed production during the off-season in our region.

Universities, research institutions, and industry specialists from various fields want to assist farmers in the production improved varieties.

4.4. Strengths in the Seed and Seedlings Sector

1. improving public-private partnerships throughout the entire seed value chain.
2. Well-established legislation and guidelines for variety development in the coffee industry,
3. Seed manufacturing and quality control, enabling simple involvement in the seed industry.
4. Reliable seed distribution systems, especially those that use the Jimma Agricultural Research Center.

4.5. Factors Limiting Potential of the Seed and Seedlings Sector

Poor seed handling procedures used by seed dealers; a lack of processing tools in most local enterprises and farmer organizations; and poorly qualified plant breeding and seed certification staff Low attention given to organizations supporting the seed sector Inadequate credit available and reluctance of multilateral organizations to invest in seed production.

5. Future Projections of Seed and Seedlings Sector

Encourage youth and women's issues Broaden farmers' understanding of potential varieties that are suitable for the agroecologist they are targeting.

Encourage the widespread use of better seeds by increasing extension teaching and service, and by educating people about the benefits of improved varieties and their distinctive qualities.

Moreover, full integration of both public and private seed enterprises should be a goal of seed marketing and extension; Better demand forecasting equipment should be installed. It is essential to develop a technique for anticipating seed demand that accounts for factors such as seed prices, the cost, and availability of other inputs, cash constraints, weather predictions, and the cycle of seeder placement times; The agricultural crew's skills should be improved strengthening the skills of agricultural workers at all levels, particularly DAs, seed producers.

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