The Experience of Coffee Plantation Development Enterprise in Ethiopia

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Abstract

Coffee Plantation Development Enterprise manages three Coffee Plantations located in three National Regional States namely SNNP, Gambela and Oromia with diverse altitude and rainfall of tropical rainforest ecosystems. The area is endowed with the high potential to grow vetiver grass luxuriously. Vetiver grass is native to South and South East Asia, where it has been used for different purposes for centuries. The Enterprise introduced the grass from Gera Research Station in 1980s. Since introduction the grass adapted to the agro ecology and found to require less work after establishment. In the last 30 years attention has been focused on intensified vetiver multiplication and disseminating its technology. In the intensification program the grass has been widely grown and distributed all over the 20,000 ha of land under coffee plantation. In line with this program utilization of vetiver grass has been undertaken to prevent soil erosion, stabilize the in farm road verges, help anchor the fill up land in the pulping station, conserve water, serve as mulch material, provide a low cost extremely effective system that offers proven solution for thatching roof of shelter and sheds and pollution mitigation by being used as waste water treatment for environmental enhancement. In the schedule of dissemination the vetiver technology has been shared with other organizations and institutions who are needy to adopt the technology basically through sales and as well the enterprise act as demonstration field for the vicinities and distal areas.

Key Words:- dissemination of technology, ecosystem, vetiver grass, vetiver growing, utilization of technology.

Introduction

Carey (2006) reported that Vetiver grass (*Vetiveria zizanioides* L), is native to South and South East Asia, where it has been used for centuries to mark boundary lines, stabilize steep slopes and rehabilitate degraded lands. He further noted that the grass has a wide adaptability range to soils which are very acid, alkaline or saline nature. The same author also showed that an annual rainfall greater than 450 mm is required for its establishment. Nonetheless, Ruskin (1993) verified that the vetiver establishes successfully in areas where annual rainfall is as little as 200mm.

Due to its extensive and deep root system, it is tolerant to adverse conditions such as extreme heat (50^{o}c) and frost (-10^{o}c). However, plants are susceptible to frost during the establishment phase (Ruskin, 1993). Though it is a hardy fast growing perennial, according to the review of Land loch Pty Ltd (2001) its growth is affected by shading, particularly during establishment.

Vetiver grass multiplication in Coffee Plantation Development Enterprise (CPDE) started in early 1980s to enhance the adoption of soil conservation practices, reap other benefits of vetiver technology and improve the sustainability of coffee production.

The first planting material was introduced from Gera Agricultural Research Station by the then General Manager of CPDE Ato Yilma Yemaneberhan. Then its development has got acceptance across all state farms who have realized the benefits of the vetiver system.

During the last three decades of its cultivation substantial experiences were gained and important lessons were learned about nursery management, transplanting, harvesting and utilization of the grass. The technology was disseminated rapidly to the vicinity and other regions.

This paper, therefore, summarizes the experience of Coffee Plantation Development Enterprise about the development, utilization and transfer of the vetiver technology.

2. ABOUT COFFEE PLANTATION DEVELOPMENT ENTERPRISE

CPDE was re-established in 1993 by council of Ministers Regulation No 151/1993. Before re-establishment, the farms were managed by the then Coffee Plantation Development Corporation under the Ministry of Coffee and Tea Development. The farms were first established by former land owners before they were nationalized by the government in 1975.

The farms are located in three National Regional States namely Oromia, Southern Nations Nationalities and Peoples Regional States (SNNP) and Gambela. The distribution of the farms in these three regions with diverse altitude and other environmental conditions are presented on Table 1.

After CPDE took over the management of the farms Bebeka and Teppi Coffee Plantations were expanded and Limmu coffee plantation was re-habilitated. Currently the Enterprise manages 20,144.07, hectares of land covered under coffee and 1267, hectares covered by cereals. There is also 562, hectares covered by different type of fruits, oil palm and spice. Rubber plantation covers 587, hectares.

Table 1. BACKGROUND INFORMATION OF THE FARMS

SN	Description	PLANTATIONS							
		Limmu					Bebeka	Teppi	
		Gomma 1	Gomma 2	Kossa	Suntu	Gummer		Teppi	Godare
1	Location								
	- Latitude	7°57'N	7°55'N	7°57'N	8°05'N	7°59'N	6°52-7°'N	7°08	7°8'N
	- Longitude	36°42'E	36°37'E	36°53'E	36°57'E	36°59'E	35°52'-36°E	35°13	35°.20'E
	- Distance from Addis Ababa (km)	416	406	409	431	434	595	587	617
2	Meteorological Data								
	- Altitude (masl)	1340-1800	1400-1750	1600-2000	1600-1720	1700-1900	950-1200	1050-1200	1200-1900
	- Rainfall (mm)	1600	1540	1920	1720	1610	1760	1630	1737
	- Temperature (°C)								
	- Minimum	14	13	12	10	12	15	15	12
	- Maximum	27	29	27	30	25	31	30	27
3	Soil								
	- Classes	Eutric Nitosol	Eutric Nitosol	Eutric Nitosol	Eutric Nitosol	Eutric Nitosol	Eutric Nitosol	Eutric Nitosol	Humic Nitosol
	- PH	4.5-6	4.5-6.9	4.5-6.9	4.5-5.8	4.5-6.0	5.0-6.0	5.0-6.0	4.5-6.0
4	Coffee Area (ha)	1454	1150	1333	1602	1861	5685	1952	4550
5	Coffee of type	Arabica	Arabica	Arabica	Arabica	Arabica	Arabica	Arabica	Arabica

3. VETIVER DEVELOPMENT

3.1 Vetiver variety planted in CPDE

As reported by Ruskin (1993) vetiver (Figure 1) belongs to the grass family and its botanic name *Vetiveria zizanioides* L. was given first by Swedish taxonomist Carolus Linnaeus. According to him the plant is native to the tropical and subtropical regions of northern India, Bangladesh and Burma, where it has been used for centuries for different purposes.

Fig.1 Vetiver grass planted at CPDE.

He further demonstrated the existence of two types. These are:-

a. A wild type which flowers regularly, set fertile seed, and is known as a "colonizer".

b. A domesticated type is the vetiver that has existed under cultivation and is non flowering and non seeding which is propagated vegetatively .

The vetiver that is found in CPDE is realized to be the second type since it is non flowering, non seeding and propagated by vegetative means.

3.2 Land development

3.2.1 Site selection

Vetiver is very easy to grow and can establish under nearly all conditions. Accordingly site selection is not an issue in the enterprise. Though it has wide adaptability it grows best in humid climate, that is too wet for normal farming (report:

Rain water harvesting with vetiver). The plantations of CPDE are situated in warm and humid agro ecology where vetiver grows successfully.

3.2.2 Land Clearing

Land clearing operation is performed by labor force using machete.

3.2.3 Nursery Management

a) Source of Planting Material

For the first time planting materials (tillers or slips) were obtained from Gera Research Station situated in South Western part of Ethiopia, Jimma zone which is managed by Jimma Agricultural Research Center. As the planted vetiver gets mature further expansion of the grass was made possible.

b) Vetiver Nursery

In CPDE where high humidity is prevailing it is normally planted as bare root slips by splitting up mature plants directly in the ground and established nursery is elucidated on figure 2.

Fig. 2. Vetiver nursery at CPDE.

Under such circumstances some vetiver plants are obtained and both the leaves and roots are cut at 20 and 10 cm respectively and planted directly in the ground. Contrary to the practices of CPDE Carey (2006) summarized the propagation techniques as follows.

- Older plants are broken up into planting slips of two to three tillers
- The tops of the vetiver are cut back to 20cm length and roots to 50mm
- Each slip is planted in a small tube or pot of 50-60mm diameter and 100 mm depth. The potting medium is well-drained sandy loam, free of weed.
- Each pot is fertilized by sprinkling with 5 g of DAP (di-ammonium phosphate)
- The pots are watered daily and allowed to grow for a period of three weeks in summer and 5 weeks in winter.
- The vetiver is ready for transplanting when at least two new shoots appear.

In the report of Manarang (1994) where the Vet farms Inc experience is described, the author tested the growth property of the vetiver in poly bags with various media. A side from this, tissue cultured vetiver plants were also tested after introduction of the stock to Philippines where she found promising results. This technique of propagation appear to differ from the practice of CPDE.

3.3 Plantation Development

3.3.1 Land Preparation

Weeds compete with the vetiver seedlings for moisture and nutrients and can shade the seedlings out. To eliminate the weed competition and ensure sound establishment the planting site is first get cleared using machete.

Once the site is cleared, the land is marked out along the gradation with pegs. Contour marking is performed on lands with slopes steeper than 3%. Following marking a small ditch 15-20 cm deep will be constructed. This ditch size is also realized to be employed in other parts of the globe where vetiver is grown (in report: Rain water harvesting with vetiver)

3.3.2 Field Planting

a) Time of planting

Giving an overview of the planting time Carey (2006) opined that in Southern Quens land (Australia) planting from April to September is avoided due to risk arising from prevalent frost. In the same presentation he elaborated the possibility of planting the vetiver through out the year in central and northern Queensland provided watering is carried out during the establishment

In view of the above mentioned practices vetiver is planted at CPDE in the rainy season. Normally in all plantations rain begins in mid March and extended to late November. Since best results are obtained from early planting in the rainy season planting commences in April and extended to August sometimes up to September.

b) Planting

Healthy and vigorous mature vetiver grass from the nursery is selected and the tops of the vetiver slips are cut back to 20 cm length and is uprooted with the ball of soil. The roots are cut back to 10 cm length. The big course clumps are transported by tractor trailers and distributed to planting sites. Vetiver is planted as bare root slips by splitting up matured plants. The following steps are employed during planting.

Steps in vetiver planting

- Normally slips are planted within two days after being dug up.
- Matured vetiver plants are broken up into planting slips of three to four tillers.
- To ensure accurate planting on the contour, levels are used.
- Slips are planted into a furrow (ditch) dug 10 to 15 cm apart to ensure a close hedge within a year.
- The roots are covered with soil and is firmly compacted.
- Usually losses of vetiver slips occur due to various reasons and infilling is continuously performed.
- Unlike the practice mentioned by Carey (2006) DAP application and mulching are not practiced.

3.4 Vetiver Maintenance

Ruskin (1993) reported that vetiver does need some care during the period immediately after planting. Consequently the plant is helped to form a hedge where a little fertilizer or little water is applied to enhance the establishment phase especially in marginal places.

An interesting point was also mentioned by him where vetiver generally requires little management at which weeding and cutting the tops (trimming) are worth mentioning.

3.4.1 Weed control

Weeds compete with the vetiver seedlings. Thus for rapid establishment of the vetiver lines, weeding is done regularly until the young plants take over.

3.4.2 Trimming

To promote tillering, the young vetiver is topped to a height of 30-40 cm. Clipping the young plants back stimulates early tillering and, therefore, a denser plant is obtained (Ruskin, 1993). In view of this trimming is practiced usually 2 to 3 times per year.

3.4.3 Fertilization

In CPDE no fertilizer is applied but Carey (2006) recommended the application of DAP fertilizer in very poor soil conditions at the rate of about 100 g per meter length twice a year for the first few years. Even in good soil condition according to his recommendation application of DAP at 50g per meter length is practiced a couple of months after planting.

4. UTILIZATION OF VETIVER GRASS

The increase in the familiarity of the plant at CPDE leads to its utilization for many purposes and substantial benefits were obtained by its application as elaborated below.

4.1 Soil Erosion control

Soil erosion is one of the most devastating problems associated with agriculture in tropical regions. It causes degradation of soil physical characteristics such as infiltration rate and soil structure and is also responsible for the decline in fertilizer use efficiency by increasing nutrient losses. The main causes of soil erosion include deforestation, overgrazing and cultivation on slopes without any form of soil conservation. Soil properties such us topography, depth, permeability, texture, structure and fertility influence erodibility of soil and type of conservation practices that can be used successfully.

Soil erosion control strategies are divided into three groups. These are agronomic measure, mechanical methods and soil management. Agronomic measure is popular in CPDE which include high density planting, cover cropping, intercropping, shading, mulching, contour planting and the use of vegetative contour hedges such as vetiver grass.

An interesting result in conserving soil was reported by Grunder (1988) in Ethiopia where grass strip treatment retained soil and catch sediment among different physical soil conservation measures (level bund, graded bund level Fanya- Juu, graded Fanya-Juu, Grass strips and control plot of traditional agricultural practices) evaluated.

Some early results from India, Indicated that rainfall runoff was reduced from 40 percent to 15 percent using vetiver hedges (compared with the control) and silt loss was reduced from 25 tons per hectare to 6 tones from a two-year old vetiver hedges on 2 percent slope (The world Bank, 1993).

Less amount of dry soil loss was also reported by Howeler et al (2002) as depicted on Table 2 and 3.

Table 2 Results of the FPR Demonstration Plots at TTDI, Huay Bong, Nakhon Ratchasima, Thailand, in 2001/02.

Treatment [1]	Dry soil loss (t/ha)	Cassava Yield (t/ha)	Starch Content (%)	Intercrop yield (t/ha)	Gross Income[2)] (t/ha)	Prod. Costs	Net Income
					←--------('000 B/ha) -----→		
1. farmers' practice: up/down ridges, no fertilizers	10.50	44.12	25.4	-	53.74	17.59	36.1
2. up/down ridges; 50 kg/rai 15-15-15 fertilizers	37.68	43.51	30.9	-	57.78	20.93	36.8
3. contour ridges; 50 kg/rai 15-15-15 fertilizers	5.86	40.28	28.0	-	51.16	20.06	13.1
4. no ridges; 50 kglrai 15-15-15 fertilizers	12.06	48.68	25.5	-	59.39	21.51	37.8
5. no ridges; 25 kg/rai 15-15-15 fertilizers	12.70	46.96	28.7	-	60.30	19.42	40.8
6. no ridges; 25 kg/rai fert.+125 kg/rai chicken manure	10.83	45.36	24.5	-	54.43	19.85	34.5
7. no ridges; 25 kg/rai fertilizer+l,000kg/lrai compost	13.09	45.63	29.0	-	58.86	20.16	38.5
8. no ridges; closer spacing (0.8 x 0.8 m)	4.52	49.27	31.6	-	66.12	21.98	44.1
9. no ridges; peanut intercrop	11.70	27.00	26.1	2.00	53.26	18.66	34.6
10. no ridges; pumpkin intercrop	5.53	40.41	23.5	3.80	85.68	23.28	38.
II. no ridges; sweet corn intercrop	16.70	17.80[3)]	25.7	7.10	57.29	18.18	44.1
12. no ridges; *Leucaena leucocephela* hedgerows	5.28	33.80	25.4	-	41.17	18.50	39.1
13. no ridges; sugarcane (for chewing) hedgerows	7.51	44.01	23.0	-	51.49	21.25	22.6
14. no ridges; lemon grass hedgerows	6.51	42.09	27.2	0.65	52.78	20.73	30.2
15. no ridges; *Paspalum atratum* hedgerows	14.24	39.09	23.3	-	45.97	19.92	26.
16. no ridges; vetiver (from TIDI) hedgerows	4.69	25.46[4)]	22.0	-	29.28	16.24	13
17. no ridges; vetiver Songkla-3 hedgerows	6.24	46.10	26.0	-	56.70	21.82	34.8
18. no ridges; vetiver from Vietnam hedgerows	8.25	41.68	24.6	-	50.10	20.62	29.4

Adapted from Howeler *et al* (2002)

[1] Variety KU-50; T_8- T_{18}were all fertilized with 50/kg rai of 15-15-15 fertilizers, and all treatments except T_8 were planted at 0.8 x 1.25 m. spacing; 1 ha = 6.25 rai

[2] Prices: cassava baht 1.31/ kg fresh roots at 30% starch
peanut 10.0/ kg dry pods
pumpkin 10.0/ kg
sweet corn 5.0/ kg
lemon grass 5.0/ kg

[3] Low yield due to strong intercrop competition and poor drainage

[4] Low yield due to competition from very vigorous vetiver grass hedgerow

Table 3 Average Results of Two FPR Erosion Control Trials Conducted by Farmers in Khook Anu Village, Thep Sathit District of chayaphum province, Thailand, in 2001/02

Treatment [1]	Dry soil loss (t/ha)	Yield (t/ha)		Root starch content (%)	Gross Income	Product Costs[2)]	Net income	Farmers' Preference (%)
		Cassava	intercrop		←---------(naht/ha) ------→			
1. farmers' practice:	14.0	12.61	-	20.3	12,736	12,018	718	0
2. contour plowing	10.2	8.41	-	20.0	8,410	11,471	-3061	100
3. up/down plowing	31.1	12.34		18.3	11,970	11,974	-4	0
4. mungobean intercro	10.3	8.70	0.306	24.0	15,516	15,392	124	82
5. lemon grass hedgerows	4.5	15.94	-	21.0	16,259	13,550	2,709	0[3)]
6. Vetiver grass hedgerows	8.0	13.02	-	22.3	13,619	13,083	536	100

[1)] Prices: cassava baht 1.20/kg fresh roots at 30% starch
Mungbean 20/ kg dry grain

[2)] Cost of cassava production without harvest 10,000/ha
Cost of C+mungbean production 14,000/ha
Extra cost of contour plowing 125/ha
Cost hedgerow planting + maintenance 1,000/ha
Harvest + transport 160/tonne

[3)] Although lemon grass hedgerows produced the highest net income, farmers do not like this practice because lemon grass does not tolerate drought and it is difficult to sell in large quantities.

Source- Howeler *et al* (2002)

Table 2 shows that most of the hedgerow treatments (T12-T18) in which vetiver is one as well as contour ridging (T3) and closer plant spacing (T8) were effective in reducing soil losses by erosion.

In the mean time Table 3 indicates that both vetiver grass and lemon grass hedgerows were very effective in reducing soil losses by erosion.

Jaspers- Focks and Algera (2006) showed that the erosion of the cohesive soil was approximately 8-10 times smaller using vetiver grass.

In addition the establishment of vetiver system has been reported to be effective in providing soil erosion control measure by Lavania *et al* (2004), Manarang (1994), Booth *et al* (2000) and Vongkasem *et al* (2004).

In CPDE the plantation sites are situated in areas with slope greater than 5% which are prone to soil erosion by runoff water. To protect the loss of this soil by erosion high density planting, contour planting and vetiver growing is employed.

Fig. 3 Vettiver hedgerows designed to protect soil erosion by runoff in coffee plantations.

Figure 3 shows the planted vetiver grass accross the slopes in coffee blocks at CPDE for the purpose of preventing the soil from erosion. Once established such hedges need no maintenance and protect the land from erosion for years, as they build up natural terraces as shown on Figure 4.

Fig4. Erosion sediment trapped by vetiver hedgerow in coffee plantations.

4.2 Moisture conservation

Although measures are not taken in the level of retaining natural moisture in the soil it is anticipated that the vetiver system helps in insitu moisture conservation. as shown on figure 5.

Fig.5. Vetiver used to conserve moisture there by increase groundwater recharge

The stiff stems of the rich hedges as reported by Carey (2006) obviously slow movement of runoff water and spread it out; trapping silt behind the hedge. This allows more water to be absorbed into the soil, thus reducing runoff. Furthermore, in the report: Rainwater Harvesting with vetiver, it was described that the deep roots 2 or 3m hold the plant firmly to the ground and the roots open up the ground, so that more of the rainwater penetrates into the ground where the rain water is harvested.

4.3 Stabilizing infrastructures

Apart from its success as a system of soil and moisture conservation, vetiver grass has proved effective to stabilize farm infrastructure such as infarm road verges and the slopes at coffee pulping stations. Figure 6 shows how vetiver can be used to stabilize the in farm roads in coffee states. The road verges could be worn down by the action of water in the absence of this vegetative cover.

Fig. 6. Vetiver used to stabilize road verges at CPDE

Figure 7 depicts the role vetiver plays to stabilize the steep slopes at coffee pulping stations. The soil on spaces between the reception and ground level at pulping station is sometimes imported from the surrounding areas or cut from the slope sides and to secure this soil from loss the slope was planted with vetiver hedges. When runoff reaches the vegetative hedges, it slows down, spread out, drops its silt load, and oozes through the hedges, a large portion of the water soaking into the land along the way. Consequently neither soil nor water is lost through the concentration of runoff in particular areas.

Fig. 7. Vetiver hedge rows used to stabilize the fill up/ cut soil at pulping stations in CPDE.

Loch (2006) confirmed the acceptance of vetiver as an important tool for stabilization of steep slopes and batters in road and railway structure by Queensland Government of different departments (Departments of main roads, Natural Resource and waters Railways and by commercial engineering consultants). Manarang (1994) also reported the use of vetiver grass for slope stabilization.

4.4 Mulching

In its natural environment coffee grows in a bed of forest, litter. Its superficial root system is, therefore, adapted to function most efficiently under such conditions. In commercial plantations it is attempted to stimulate these conditions, by keeping the bare soil covered with a layer of organic mulch material (Hill,1987). Recognizing the economic return from mulching the operation is exercised in the Enterprise. The benefits obtained from mulch includes suppressing weeds, conserving moisture, improving the fertility of the soil, protecting erosion, regulating the soil temperature and ultimately contribute to better quality coffee.

Mulch is normally applied at CPDE near the end of the rainy season for conserving moisture. It is also common practice in the Enterprise to ring mulch young coffee tree at planting time targeted in suppressing weed growth and conserving moisture. It is placed 5.0 cm away from the stem to just beyond the drip zone at 5 cm thickness.

The materials that are used as mulch are vetiver grass and other plant residue such as stalk and cob of corn, coffee husk, coffee pulp, banana trash and elephant grass.

In this regard after the vetiver hedges have been properly established, it is normally cut down and the leaves are used as mulch at the base of the coffee tree (Figure 8).

Fig. 8. Vetiver grass used as mulch material for young coffee trees in CPDE.

4.5 Thatched roof

The predominant thatching material in use in Ethiopia up until now is straw-either long straw or combed cereal reed. However, in recent years of this century thatching material was in decline in the towns and substituted by corrugated iron sheet, because of the materials become far more readily available than ever before. But in rural areas thatching is practiced and extensively long straw is used, though other grass types are performing well.

Manarang (1994) from Philippinse and Booth *et al* (2006) from Indonesia reported the use of vetiver grass mainly for roof thatching after cutting off the leaves of mature plants for drying. In line with this at CPDE vetiver is used as thatching material for roofs of shelters where casual laborers reside during coffee harvest and as shed which serves as reception for harvested coffee in the field (Figure 9 and 10 respectively).

Fig. 9. Thatched shelter using vetiver grass

Fig. 10 Thatched shed using vetiver grass

4.6 Coffee effluent discharge

Red cherry arriving the pulpery is pulped where epicarp (red skin) is removed leaving behind the parchment coffee. The parchment is covered with pulp rich in sugary material (mucilage) which is removed by fermentation and /or mechanical mucilage remover and washing. The water from the first washings of the fermented coffee (effluent) is polluted to be used. For effluent treatment many technologies are adopted and vetiver is one. Loch (2006) reported for successfully treating the effluent using vitiver grass. CPDE is thriving to adopt the technology for treating the effluent discharged from coffee pulpery. Figure 11 shows the vetiver system designated for effluent treatment. Here the effluent is flowing over the vetiver system through the ditches, Where it slows down the flow of the effluent, drops the effluent and clean water oozes through the vetiver system.

Fig 11. Vetiver system used to treat effluent discharged from pulpery

5. TRANSFER OF VETIVER TECHNOLOGY

There are diverse techniques to transfer the vetiver technology to show up its value to the people. In Indonesia Booth *et al* (2006) present that dissemination of the vetiver information to farming communities is made possible through introducing, holding conference, by word of mouth, and by the passion of children who took the challenge of being the first generation with access to knowledge and their way of life. They further established that internet research and email communications, training, regular news letters and carefully worded, strategically placed paragraphs in the local media were used as tools to attract the enquiries about vetiver. In Thailand, Howeler *et al* (2002) showed that farmers participatory research approach was also used to adopt the vetiver technology. As stated by Manarang (1994) a study tour program was organized by the government of the philippense to introduce the technology and the government agencies such as the Natural Recourses work aggressively to promote the technology where the response to the promotion efforts were encouraging and vet farms have done substantial volume of vetiver application projects all over the country.

In CPDE the technique employed by the enterprise to promote the vetiver technology is basically through sales of the clumps upon request by organizations and institutions who are needy to adopt the technology. Accordingly clumps of vetiver grass were sold to Governmental, Non-governmental and private institutions.

List of some of the organizations and institutions who purchased vetiver planting materials from CPDE

1. Fincha sugar Factory
2. Green Coffee Agro Industry
3. Beta woreda Agriculture office
4. Guraferda Woreda Agriculture Office
5. SNNP Agriculture Bureau (Welayeta zone)
6. Gemadero Coffee Plantation
7. Menschen für Menschen

8. Elubabor Betel Sinodose
9. Yalewgeta Farm

In addition to sales the enterprise showed keen interest to promote the technology by acting as demonstration field to interested parties in the vicinity and distal areas.

6. CONCLUSION

Coffee Plantation Development Enterprise manages three coffee states distributed in different Agro-ecology of tropical rainforest eco- type where vetiver grass is successfully multiplied.

The vetiver grass cultivated in the Enterprise was introduced from Gera Research Station under Jimma Agricultural Research Center.

Vetiver (V. zizanioides) is a densely tufted wiry, glabrous and perennial grass which has no rhizomes or stolons and is propagated by slips usually ripped off the main clump and jobbed into the ground like seedlings. Although the growth is tardy initially the plants develop quickly once roots are established and found to require little management then after.

Social, Environmental and Agricultural importance of vetiver grass in CPDE.

- Protection of coffee fields against erosion by high-velocity flows
- Stabilization of road verges and land fill at pulping station
- Serve as mulching material for coffee trees
- Conserve water by harvesting the rainwater
- Provide thatching material for root of shelters and sheds
- Pollution mitigation by being used as effluent treatment

In an endeavor to enhance the dissemination of the vetiver grass technology, the enterprise has been and still act as a strong extension partner to governmental, non-governmental and private organizations in the country.

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