Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.5, No.14, 2015

Survey of Insects and Diseases of Fruit Crops in SNNPR: In the Case of Kafa Zone

Minyahil Kebede (Corrosponding author)
Southern Agricultural Research Institute, Bonga Agricultural Research Centre , P.O.Box 101, Bonga, Kafa zone, Ethiopia.

Abstract
The aim of this study was to identify and document diseases and insect pests of major fruit crops of Kafa Zone. The survey was conducted in 2012/13 fiscal year during belg cropping season at Gewata and Chena Districts. The elevation of the surveyed area was ranged from 1445 to 1792 m.a.s.l. Major fruit crops of the study area were Avocado, Mango, Banana, and Orange whereas Lemon, Papaya, Pineapple, Sconcoya ("*Gishita*"), Guava, Jackfruit, and Apple were the minor fruit corps of the study area. Several diseases and insect pests were recorded and identified in the surveyed area. Some pests were found to be major – which needs to take action – and others were minor during the time of survey. The most important insect pests of the area were Fruit flies (on Mango and Orange), and Citrus leaf miner and scale insects (on Orange and Lemon). Also, Citrus leaf and fruit spot (on Orange and Lemon), Fusarium wilt of Banana (on Banana), Anthracnose (on Mango, Avocado and Papaya), Powdery mildew (on Avocado, Papaya and Mango), and Scabs (on Avocado) were important diseases of fruit crops of the area. Besides, Apes, Birds and Rats were among the vertebrate pests of fruit crops in the area. Therefore, the diseases and insect pests that were recorded as important pests needs researches and development intervention works. Moreover, regular monitoring strategy has to be designed since; one minor pest at a time became major pest on other time.
Keywords: *Fruit crops*, *Diseases, Insects pests, and Vertebrate pests of fruits*

1 Introduction

Ethiopia is agro-ecologically diverse and many parts of the country are suitable for growing temperate, sub-tropical and tropical fruits. For example, substantial areas in the southern and south-western parts of the country receive sufficient rainfall to support fruits adapted to the respective climatic conditions. In addition, there are also many rivers and streams which could be used to grow various fruits. Ethiopia has a potential irrigable area of 3.5 million ha with net irrigation area of about 1.61 million ha, of which currently only 4.6 % is utilized (Amer, 2002). Moreover, according to CSA 2011/12 report, about 61,472.74 hectares of land is under fruit crops in Ethiopia.

Despite this potential however, the area under fruits is very small and mainly smallholder based. According to the Ministry of Agriculture and Rural development (MoARD, 2005), there are about 3 million farmers involved in fruit production with a total area of about 43,500 ha and producing about 261,000 t annually. Even though the number of farmers seems high, each farmer grows very few trees of unimproved varieties/cultivars which are also poorly managed and are mainly for home consumption, except banana production in the south. These fruits are typically cultivated to supplement household income from their main crops.

Diseases are often the most important constraint to the production of tropical fruit. They indirectly reduce yields by debilitating the plant, and directly reduce the yield or quality of fruit before and after they are harvested. They range from esthetic problems that lower the marketability of the harvested product to lethal problems that devastate local or regional production. Moreover, fruit crops in Ethiopia are attacked by numerous insect pests and diseases which has been one of the challenges in the development sector.

Previous works on fruit crops protection were focused on documentation of pests that attacking these crops and prioritizing their importance in some selected fruit production areas which include the Central Rift Valley, North Shoa, South Wollo, Eastern Ethiopia, Southern Ethiopia and Gambella regions. However, surveys were not conducted in Kafa zone of Southwestern Ethiopia. Therefore, this study was aimed to identify and document diseases and insect pests of major fruit crops grown in Kafa Zone.

2 Materials and Methods

2.1 Description of Kafa Zone

Kafa zone has a total area of 10602.7 square kilometer and it lies at an altitude ranging from 500 to 3500 meters above sea level. Most part of the Kafa zone is high lands characterized by a rolling plateau. The zone is sub-divided in to ten *woredas* (districts) namely: Gesha, Chena, Gimbo, Menjieo (Adiyo), Tello, Cheta, Bita, Gewata, Saylem and Decha. As regards the agro climatic condition, out of the total area of the zone *Dega* shares 11.64%, *Woyna dega* 59.45% and *Kola* shares 28.91%. The mean annual temperature of the zone ranges from 10.1 to 27.5°C and the mean annual rainfall of the zone ranges from 1001 to 2200 mm. Bonga is the

administrative center of the Kafa zone situated at a distance of 449 km southwest of Addis Ababa in SNNPRS. Topographically Bonga lies at an altitude of 1650 meters above sea level and has a *Woyena dega* type of climate. Its average annual rainfall is 1750 mm [(1)].

2.2 Methods

Survey of insect pests and diseases of fruit crops was carried out during *Belg* cropping season of 2012/13 at Chena and Gewata districts of Kafa Zone. In each district, two typical fruit growing *kebeles* were selected (i.e. Gota & Yaga from Chena, and Mashamalo & Achiwa from Gewata). Focus groups discussions were undertaken with key informants [included development agents, rural elders and other community representatives representing different age and gender groups] on the role of fruits in farmer livelihoods, trends and status of fruit production, and on major problems constraining the production and productivity of fruits. Subsequently, at the end of focus group discussion 10 farmer households per kebele were selected and interviewed by using structured questionnaires. Also, a fruit farm of each selected household was assessed for diseases and insect pests. Simultaneously, the insects and diseases data were recorded with their approximate identification.

3 Results and Discussions

3.1 Socio-Demographic Characteristics of the Study Area

Gender and Marital Status

According to the result of the survey as illustrated in Fig1, 78% and 22% of the respondents in both districts were male and female, respectively. However, male respondents were some higher in number (87) in the case of Chena than Gewata (71). The marital status of the respondents in Chena were all married but not widowed. Whereas in Gewata 88% were married and 12% were widowed. In general, 94% and 6% of the respondents were married and widowed in both districts were male and female, respectively.

Age

The survey results showed that (Fig 2), the ages of interviewed farmers ranged between 24 to 87 years. About 43.75% respondents in both districts had age between 25 – 45 and 46 – 66; which is more productive age range, thus could create a conductive environment to increase fruit production and productivity. While small amount (3.125% and 9.375%) respondents had an age range of $\leq$ 24 and 67 – 87, respectively.

Family Size

As indicated in fig 3 most farmer households (about 43.75 %, 28.125% and 15.625%) in both districts had household members of 8 – 10, 5 – 7 and 2 – 4, respectively. At the study area, those households with higher members are very few; about 3.125% and 6.25% in both districts.

Educational Status

Moreover, majority of the farmers (about 56.25%) were uneducated in both districts. This therefore may call for more attention must be given for elder education to capable the farmers for smooth dissemination of good agricultural technologies. However, about 25%, 9.375%, 6.25% and 3.125% of the farmers were attended formal education ranging from Primary (1-4), Junior (5-8), Secondary (9-10) and Tertiary (>10) levels in both districts, respectively (table 1). These were taken as advantages for extension of improved and/or good fruit production practices and technologies with in relatively short periods of time.

Table 1 Educational Status of the Household Heads

Education Level of respondent	**Percentage of respondents**		
	Chena	**Gewata**	**Total**
None (illiterate)	46.7	64.6	56.25
Primary (1-4)	40	11.8	25
Junior (5-8)	13.3	5.9	9.375
Secondary (9-10)	0	11.8	6.25
Tertiary (>10)	0	5.9	3.125

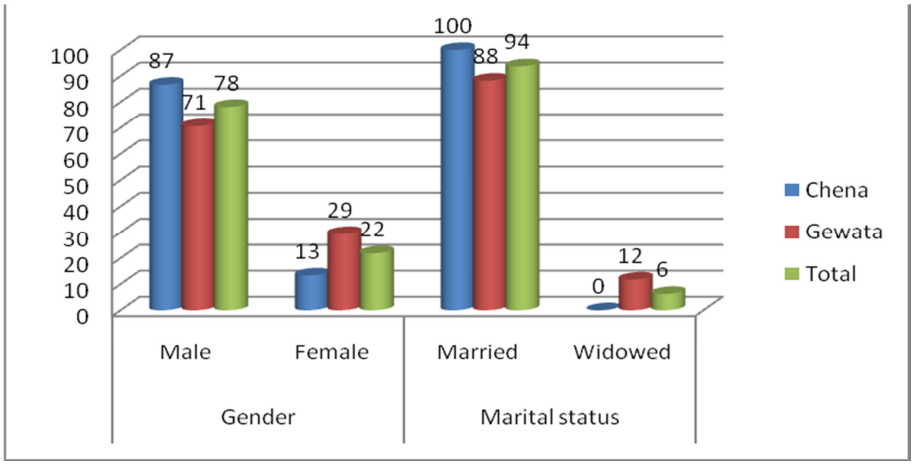

Fig1. Gender and marital status of the study area

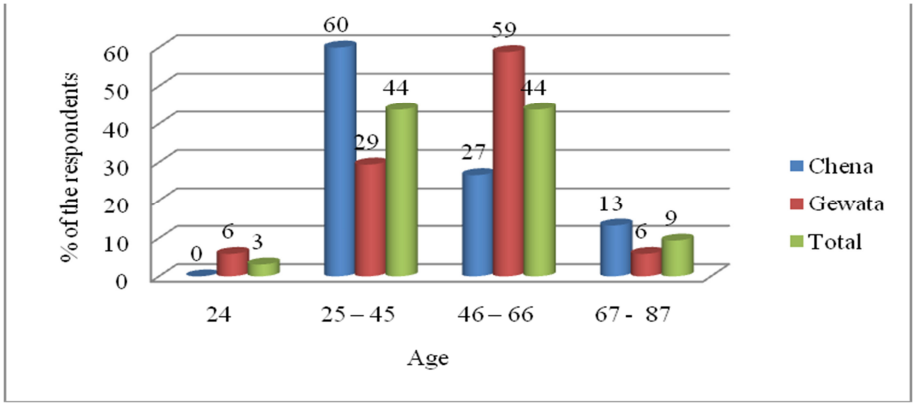

Fig2. Age range of the respondents

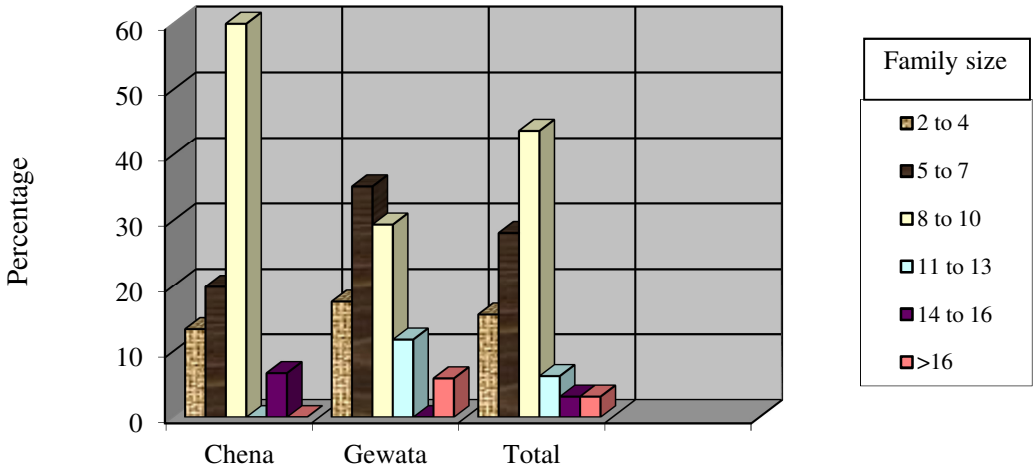

Fig3. Family size of respondents

3.2 Fruit Production

3.2.1 Fruit Crops of the Study Area

The major fruit crops cultivated at the study area were Avocado (*Persea americana)*, Mango (*Mangifera indica)*, Banana (*Mussa spp.)* and Orange *(Citrus sinensis* L.Osbeck*).* Whereas Lemon *(Citrus limon* (L.)

Burm.f.*),* Papaya *(Carica papaya),* Pineapple *(Ananas comosus),* Soncoya *(Annona spp),* Guava *(Psidium guajava)* and Apple *(Malus domestica* were among the minor fruit crops cultivated by few farmers of the study area. All farmers of the study area were cultivated their fruit crops at small plots of land.

According to the survey result, the majority of farmers in Chena and Gewata are small landholders cultivating their fruit crops in fields that range from 0.06 – 1 ha in size. Also, about 43.75% and 37.5% farmers were cultivated fruits on 0.25ha and 0.13ha field of land at, respectively. Generally, in both districts the average field size that was allocated for fruit cultivation was 0.30 hectares land which is very small (table 1).

Table 2 Field Size Cultivated by Fruit Crops

Field size cultivated by Fruit crops (in ha)	Percentages of respondents		
	Chena	Gewata	Total
0.06		5.88	3.125
0.13	60	17.65	37.5
0.25	40	47.06	43.75
0.38		17.65	9.375
0.50		5.88	3.125
1.00		5.88	3.125

3.2.2 Source of Information for Fruit Production

The leading sources of information about fruit production to the famers were farmer-to-farmer information exchange (43.75%) as to a report of the assessed districts (Table 6). The combination of farmer-to-farmer and development agents plays significant role as reported by 25% farmers. Development agents alone plays considerable role as reported by 21.875% of the sample farmers. Moreover, mass-media also play an important role in technology extension that in the survey area about 6.25% of the farmers were found owner of radio (table 3).

Table 3 Farmers' sources of information for fruit production

Sources of information	Percentages of respondents		
	Chena	Gewata	Total
Farmer-to-Farmers information Exchange	86.7	5.88	43.75
Development agents	0	41.18	21.875
Farmer Organizations	0	5.88	3.125
Farmer-to-Farmer and development agents	13.3	35.3	25
Mass media/Radio	0	11.76	6.25

3.2.3 Planting materials used and their Sources for Fruit Production

3.2.3.1 Planting Materials Used for fruit Production

The study manifested that, seeds, seedlings and suckers were used for fruit production at the study area. Among these, seeds and SSS were the major planting material used (86.67 percent and 13.33 percent, respectively) for fruit production at **Chena**. Whereas, SS, SSS and seedlings were the main planting materials used (47.06 percent, 29.41 percent and 17.65 percent, respectively), but seeds are the minor planting materials used (5.88 percent) for fruit production at **Gewata** (table 4).

Table 4 Planting materials used for fruit production

Planting Materials	Percentages of respondents		
	Chena	Gewata	Total
Seeds	86.67	5.88	43.75
Seedlings	0	17.65	9.375
SSS	13.33	29.41	21.875
SS	0	47.06	25

NB: - SS=Seedlings and Suckers, SSS=Seeds, Suckers and Seedlings

3.2.3.2 Source of Planting Materials for Fruit Production

Different banana types are available in both districts (Chena and Gewata) and informants indicated that some banana type was introduced from Mizan, Jimma, Holeta and Arba-Minch by some curious model farmers, NGO (World Vision at Gewata) and Agricultural office. For instance, Gauwrasha is one among the model farmers of Masha-Malo kebele of Gewata district who introduced different banana varieties/cultivars that shows good performance to resist wilt (in local language /Kafegna/ known as *Nusho,* very important disease of banana at the localities) from Jimma, Holeta and Arba-Minch. Some informants also highlighted that they got Mango and Avocado seedlings from NGO (only at Gewata), and Agricultural Development Offices (at both districts), but

the informants do not know the origin, the name of the variety and the year it was introduced. Further, Sweet Orange is another important fruit crop in the study area but now a day it is out of production due to the disease Anthracnose (locally known as *Cholera,* that devastate the Sweet Orange of the study area). In general, major fruits introduction to both districts were the farmer's own initiatives and the dissemination was processed from farmer to farmer.

Table 5 Sources of planting materials for the farmers

Source of planting material	**Percentages of respondents**		
	Chena	**Gewata**	**Total**
Own	93.3	11.76	50
Purchased	0	41.18	21.875
ADO	6.7	41.18	25
NGOs	0	5.88	3.125

Key: - ADO=Agricultural Development Offices, and NGOs=None-Governmental Organizations

There are different sources of plating materials used for fruit production by the farmers of both districts. Table 5 showed, 50 percent of informants were responded that they used their own planting materials, i.e. they collected large fruits without defects for seed use. On the other hand, 21.875 percent of respondents purchase planting materials from curious farmers (model farmers) for fruit production in both districts/*woredas* for fruit production. Besides, 25 percent of farmers of the study area were obtained planting materials from Agricultural Development Offices. Also 3.125 percent of farmers (from Gewata) were reported that NGOs provided planting materials for fruit production. These therefore alarmed the need to work on the supply or access of improved planting materials (varieties and/or cultivars fruit crops) onto the farmers of both districts.

3.2.4 Role of Fruit Crops

Fruits are important in the provision of food nutrients such as vitamins and minerals and carbohydrates, income for the producers and to some extent foreign exchange for the country. According to the key informant discussions, fruit crops were used as a source of food (eating their fruit solely or with other foods), income generation and as a shade for other cash crops like coffee.

Table 6 Purpose of fruit production for Chena and Gewata farmers

		Percentages of respondents		
		For food	**Both for food and income**	**All**
District	Chena	20	80	0
	Gewata	0	52.94	47.06
Total		9.4	65.6	25

NB: - all= for food, both for consumption and income generation, and shade purpose (coffee)

As indicated at table 6 above, farmers of **Chena** and **Gewata** districts cultivated fruit crops for food, income generation, and shade purpose to cash-crops like coffee. Majority of the farmers (65.6 percent) responded that they cultivated fruit crops both for food and income generation. While, 25 percent and 9.4 percent were grown fruit crops for all purposes (food, income generation and shade) and food, respectively.

Table 7 Percentage of respondents and income generated from fruit during 2004 - 2005 E.C

Income Generated (birr)	**Chena**		**Gewata**		**Total**	
	2012	**2013**	**2012**	**2013**	**2012**	**2013**
0.00	46.67	100	5.88	100	25	100
50.00	13.33				6.25	
300.00			11.76		6.25	
500.00	6.67		29.41		18.75	
1000.00	20		5.88		12.5	
1200.00	6.67				3.125	
1500.00			23.53		12.5	
2000.00			17.65		9.375	
3000.00	6.67				3.125	
3700.00			5.88		3.125	

3.3 Factors Affecting Fruit Crops Production and Productivity of the Area

Focus groups of the study area showed that, major limiting factors for fruit production and productivity at both districts were lack of improved fruit varieties/cultivars supply, damage by disease and insect pests, attack by vertebrate pests (like, birds, and apes) and climate change (abortion of fruits due to lack of rain and cracking of

fruits).

Farmers obtained very few seedlings of improved fruit varieties/cultivars from agricultural development offices (in both districts) and NGO; World vision, (in Gewata district) however, both of them (ADO and NGO) does not provide enough seedlings with full package. In addition to this, lack of follow ups and poor management of fruit crops contribute its part for limited production and productivity of fruit crops of the study area.

Despite these, **Yaga** and **Gota** kebeles of **Chena** district in particular, were far from main road, their topography was very undulating, no road for truck(car) and not accessible for market. However, farmers of this district were used domestic animals (Mule, Horse and Donkey) as a means of transportation.

3.3.1 Insect Pests and Diseases of Fruit Crops of the Study Area

The survey result indicated, the fruit crops of kafa zone are subjected to various diseases and insect pests. According to the focus group discussion, these pests caused a negative impact on food security of the farmers by attacking fruits and increasing post-harvest losses thus led to reduce the income.

3.3.1.1 Insect Pests of the Study Area

Major insect pests of the study area were Fruit fly (on Mango), Leaf miners (on Sweet Orange and Lemon) and Scale insects (on Avocado and Sweet Orange). Whereas, Beetles (on Sweet Orange), Fly (on Mango and Avocado) and Plant Bugs were the minor insect pests observed on fruit crops.

3.3.1.1.1 Fruit Fly

Fig 4 Adult fruit fly

Fruit flies were the major insect pest of Mango and miner pets of Sweet Orange of the study area at the reproductive stage—from fruit setting to maturity. Adults and larvae maggots cause fruit damage. In general, larval of fruit flies causes premature fruit drop and destroys the pulps of the fruit. The fruit eventually rots making it unsuitable for harvesting and human consumption. However, farmers of the study area were not familiar with this pest (i.e.; not understood well), but they believe that the maggots of spoiled mango was formed by flies that were no harmful. Due to this reason, there were no control options practiced by the local farmers, no suggested control measures from agricultural development offices and any other else. This thus invites any organization—that work for improving the livelihoods of rural communities—to cope with fruit fly pests of the study area.

3.3.1.1.2 Citrus Leaf miner (**Phyllocnistic citrella** ***Stainton***)

It was observed that damage by leaf miners were serious on young leaves of Lemon and Orange. The injured epidermis takes the shape of twisted silvery galleries. On older leaves, brownish patches were formed which serve as foci of infection for citrus canker. When the attacked leaves remain on the plants for a considerable long time, it gradually spreads to fresh leaves. Heavily attacked plants can be spotted from a distance and the photosynthesis was adversely affected, vitality is reduced and thus lead to reduction in yield.

3.3.1.1.1 Scales

Scale insects were observed as major pest of orange and avocado. Scale insects were attached themselves to leaves and fruit of orange and avocado for sucking sap from the crop and can weaken the growth of plants (stunted), its leaves may develop yellow blotches, the branches may die, and some or all of the leaves may fall off. Like fruit flies, there were no control options practiced by the local farmers of the study area.

3.3.1.2 Diseases of Fruit Crops

According to the surveyed result, major diseases observed during the survey were Anthracnose (on Mango, Avocado, and Papaya), Powdery mildew (on Mango, Papaya and Avocado), Spot (on Mango, Avocado, Sweet Orange, Lemon, Papaya, Pineapple, Jackfruit and Guava), Scabs (on Avocado), and Fusarium wilt of banana (on Banana); whereas Rust (on Avocado, Papaya and Guava), dieback (on Avocado), Soot (on Mango and Avocado), Gummosis (on Mango) and Blight (on Mango) are minor diseases of fruit crops the study area.

3.3.1.2.1 Anthracnose

Anthracnose was very important disease of Mango in the study area. The disease is caused by *Colletotrichum spp.* It was observed that anthracnose attacked leaves, panicles, and fruits of Mango. According to Scot 2010,

symptoms of anthracnose:

☞ **Leaves;** New mango leaves are most susceptible to infection, especially when their emergence coincides with frequent rainfall. Leaf lesions begin on these immature leaves as tiny brown to black specks which develop chlorotic halos. Mature lesions on fully expanded leaves are dark brown and often irregularly shaped, not vein delimited, and tending to occur at leaf margins. The lesions can remain small under most conditions, but can enlarge to create leaf blight where relative humidity is high.

☞ **Panicles;** Infections appear initially as tiny, well-defined black flecks or specks on all tissues of the panicle. As the infection spreads, clusters of flowers turn inky black and die. The panicle becomes prone to nearly complete disintegration.

☞ **Fruits;** Development of the lesions occurs within days from quiescent infections after the fruits begin to ripen. Irregular, dark brown to black lesions form anywhere on the fruit and often coalesce to form larger, severely blighted areas. Lesions are somewhat depressed or sunken, initially superficial but can penetrate deep into the flesh as disease progresses. During humid or moist conditions, abundant orange-brown to salmon colored spore masses of the pathogen form in lesions on the fruit surface.

Even if, the disease was an important disease, however there was no management options that were practiced by farmers of both districts and also no control options were recommended by agricultural offices of the study area.

3.3.1.2.2 Powdery Mildew

Fig 5 Powdery mildew on Avocado and Mango leaf (Photo by Minyahil K.)

Powdery mildew disease was a major disease of Avocado and miner disease of Mango at Gewata district. However, its occurrence was miner in the case of Chena district. Symptoms of powdery mildew observed on fruit crops were white powdery growth of fungus developed over the leaves that then shrivel and die. Moreover, the powdery growth was more common on the upper surface of the leaf. Powdery mildew grows well in warm, humid conditions. The disease becomes serious disease in dry weather. According to Bruce R F., 2006, the spores of the fungus are blown by wind and can develop without water provided the humidity is high. Saying these, like other diseases of fruit crops there is no control options recommended or practiced for powdery mildew at both woredas.

3.3.1.2.3 Spots

A B

Fig 6 Leaf and Fruit spot of Citrus

- **Leaf and fruit spots of Citrus**: was the number one constraint for Sweet orange and lemon production in the study area. The disease was locally (in Kafinoono) known as ***kolera***. This disease was devastated particularly Sweet Orange and Lemon crops in both of the study area. The citrus families of the study area were out of production due to this disease. Also like anthracnose, there were no management options for leaf and fruit spot of citrus in the study area.
- ***Algal leaf spot of Avocado****: was commonly observed at both woredas. However, it was not serious disease. Hence, the disease was very common in the rainforest and can spread from many trees. It occurs on many other perennial crops.*

3.3.1.2.4 Avocado Scab

Avocado Scab disease is widely distributed and it is the common but not destructive to Avocado fruits throughout the study area. The disease is caused by the fungus *Sphaceloma perseae* Jenkins. It was found to attack the fruits and leaves of the plants during the survey.

3.3.1.2.5 Fusarium Wilt of Banana

As showed at table 13 and 14, banana wilt (locally known as *Nusho)*; is the most destructive diseases of Banana throughout the study areas. The disease is caused by fungus *Fusarium oxysporum.* The symptoms of the disease are reddish brown discoloration of the xylem of roots, bright yellow color of old leaves, wilting and eventual death of the plant.

Fig 8: Symptom of Fusarium wilt of banana

Table 7 Incidence and Severity of Major Diseases of Fruit crops

		Districts	
		Chena	**Gewata**
Altitude ranges		**1445 to 1792**	**1587 to 1749**
Anthracnose	Incidence (%)	10 - 100	10 - 80
	Severity (%)	5 - 75	5 - 40
Powdery Mildew	Incidence (%)	-	20 - 100
	Severity (%)	-	5 - 45
Spot	Incidence (%)	20 - 100	10 - 80
	Severity (%)	5 - 40	5 - 30
Avocado Scab	Incidence (%)	60	50
	Severity (%)	20	20
Banana Wilt	Incidence (%)	30 -100	40 - 100
	Severity (%)	10 - 100	10 - 50

It can be seen that table 7 showed the major diseases that were present at the surveyed areas with different incidence and severity levels. Among the major diseases of the study area, anthracnose, banana wilt and spots were the most frequently occurring and widely distributed. The incidence and severity of anthracnose, banana wilt, and spot, respectively were 10–100 and 5–75, 30–100 and 10–100, and 20–100 and 5–40 percent at Chena district and 10 – 80 and 5 – 40, 40 – 100 and 10 – 50, and 10 – 80 and 5 – 30 at Gewata district. However, powdery mildew was occurred at Gewata district with 20 – 100 and 5 – 45 percent incidence and severity, respectively. At the time of survey, powdery mildew disease was not occurred at Chena district. This might be due to unfavorable environment for the occurrence of powdery mildew.

3.3.2 Vertebrate pests of the study area

Accordingly the survey indicated that, apes, birds and rats were among the vertebrate pests of the study area that cause damage to fruit by feeding on fruits. This intern contributes for declining the fruit production and productivity of the study area.

Fig 9 Pineapple fruit Attacked by Rat

Fig 10 Cracked mango fruits

3.3.3 Damage by Non-Biotic Factors

Farmers of the study area; particularly Mashamalo kebele, told that from near recent years (within the past two years) fruit cracking of mango and early fruit drop/ abortion of avocado and mango were common. Thus, farmers elucidated that the cause may be climate change; as a result of shortage of rain and long sun shine season. Currently, there is no variety/cultivar that shows resistance to this non-biotic factor.

4 Conclusion and Recommendations

Most farmers of the study area were in a productive age range 25 – 45 (43. 75%) and most had a family size 8-10 (43.75%). Also, about 43.75% and 56.25 % of the respondents were educated (easily understand the importance of agricultural technologies) and uneducated, respectively. This indicted that there were opportunities for increasing fruit production in the study area; hence about 43.75% of farmers were able to easily understand and accept fruit production technologies which in turn will have a positive impact on fruit production activities.

According to the surveyed result, the major fruit crops (in terms of abundance and production status) were *Persea americana, Mangifera indica, Mussa spp.* and *Citrus sinensii* L. Osbeck. While, *Carica papaya, Annona spp, Psidium guajava, Artocarpus heterophyllus* and *Malus domestica* were minor fruit crops.

Generally there are many factors that were contributed for the low production and producitivity of fruit crops of surveyed area. Among these factors,

- Allocation of small plots of land for fruit crops production; almost all farmers (93.75 percent) were allocated less than 0.5 hectare of land for producing fruit crops. In other words, 6.25 percent of farmers were allocated more or equal to 0.5 hectare of land.
- Lack of improved fruit production technologies; the survey showed that the farmers of the study area were no access to improved fruit production technologies. However, they used their indigenous practices for growing fruit; thus had a negative impact. For instance, about 72 percent and 43.75 percent of farmers were used local seeds and F-T-F information transfer for fruit production, respectively.
- Attack by pests; farmers of the study area were responded that pests were the prioritized constraint of fruit production. Thus, diseases were the number one constraint of the study area. Anthracnose, Leaf and fruit spot of citrus and *Fusarium wilt* of banana were among the constraining diseases of fruit crops. Also, fruit flies were identified as a problematic insect pest of the study area. However, there is no control options practiced against these constraining pests in both woredas.

Relaying on these facts, I hereby point out issues that need work in the future: -

- Major pests (diseases and insect pests of fruit crops of the study area) needs researches and development intervention works; to increase fruit production and productivity.
- Collaboration work is needed (among Development Offices, Research Centers and any organizations that work for the development of rural farmers livelihood) to provide improved fruit production technologies; the outputs of researches, for target communities. These includes:
- Improved varieties/ cultivars of fruits
- Improved agronomic practices
- Integrated Pest Management strategies to minimize/control; Leaf and fruit spot of Citrus, Fusarium wilt of Banana, Anthracnose, and Shoot fly of Mango.
- Trainings for development agents, fruit producers/farmers, and agricultures offices to build their capacity through knowledge and skill transfer and motivate them for fruit production.
- Moreover, regular monitoring strategy has to be designed since; one minor pest at a time became major pest on other time.

5 References

- 1. http://www.southinvest.gov.et/potentialKaffa.htm. Potentials of Kafa Zone. September 17, 2011.
- Amer, M.H. 2002. Ethiopia, the Sudan, the Libyan Arab Jamahiriya and Somalia: Status of irrigation and drainage, future developments and capacity building needs in drainage. In International Programme for Technology and Research in Irrigation and Drainage (IIPTRID): Capacity Building for Drainage in North Africa. IIPTRID capacity building report. FAO, Rome. March 2002. Pp. 121-143.
- Bruce R French, 2006. Diseases of Food plants in Papua New Guinea. A compendium. Australia.
- CSA (Central Statistical Agency). The Federal Democratic Republic of Ethiopia Central Statistical Agency. Agricultural Sample Survey, report on area and Production of Major Crops, Addis Ababa, Ethiopia. 2011 / 2012 (2004 E.C.).
- MoARD (Ministry of Agriculture and Rural Development). 2005. Vegetables and Fruits Production and Marketing Plan (Amharic Version), Ministry of Agriculture and Rural Development, Addis Ababa, Ethiopia.
- Scot Nelson C. 2010. Mango anthracnose (Colletotrichum gloeosporiodes). College of Tropical Agriculture and Human Resources; University of Hawaii, Department of Plant and Environmental Protection Sciences, Manoa.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar