



Research Article

# Survey of diseases of major crops in Darolebu district, West Hararge, Ethiopia

Berhanu Tamiru Emana

Addis Ababa University, College of Veterinary Medicine and Agriculture, P.O. Box 245, Fiche, Ethiopia.  
Email: btamirue@gmail.com, Tel: 251- 111352910

A survey was conducted in 2012 to assess diseases on major crops grown in Darolebu district, west Hararge zone. More than 15 sites and more than 20 crops were visited at research center and on farmers' field. Eight diseases on sorghum, four on maize, and two on haricot bean, one on ground nut were recorded. The expected yield of cereal crops in this cropping season from the cultivated land is far below the national average. Some of the farmers responded that no improved technologies such as improved seeds, fertilizers, fungicides are available to increase their yield. From this study the major diseases on different crops are identified and there is a need to introduce improved crop production techniques with full package and practical integrated disease management program.

**Key words:** Diseases, major crops, integrated disease management

## INTRODUCTION

In Darolebu district, West Hararge zone major crops grown are from cereals: sorghum, maize, tef, finger millet and from lowland pulse crops: Haricot beans from oil seed crops ground nut and sesame from Horticultural crops hot pepper and sweet potato and from perennial crops chat and coffee. This is the first general diseases surveys on major crops grown in the woreda.

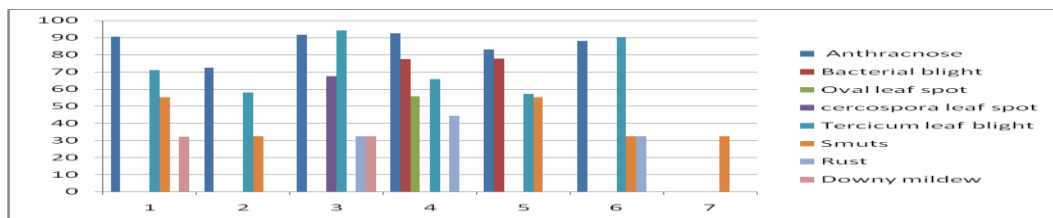
In area coverage, more land is allocated for sorghum and maize other crops such as groundnut, haricot bean, sweet potato, tef, hot pepper, chat and coffee are also important. Most of the production comes from small-scale subsistence farmers. Production and productivity of the crops are very low. Yields of major cereal crops are below 5qtha<sup>-1</sup> which is below the national average. This is due to low potential of the crop varieties, soil fertility problems and poor disease management practices. Diseases are among the major factors for yield decrement according to farmers of the area. Losses due to diseases estimated to be higher than 40% without including storage pest damage. (Tewabech *et al*, 2001) reported that yield loss due to grain store in Ethiopia

reaches from about 2-30%. (Eshetu *et al*, 2006) estimated sorghum yield loss on a variety of sorghum cultivars differing in resistance using artificially inoculated versus protected (apron plus) options. Results indicated that sorghum yield loss ranged from 1 to 54%, with large variations across test locations, seasons and types of genotypes tested.

The objective of this study was to determine the major diseases of major crops grown in Darolebu district.

## MATERIALS AND METHODS

A survey was conducted from September 24 to October 3, 2012 to assess types of diseases of major crops in Darolebu district, west Hararge, Oromia region. More than 30 fields at an altitude ranging from 1400 to 1735 meter above sea level were visited from north to south and to the east of mechara town. Sites were selected at a distance of about 10km far from each other. One or more farm fields were taken from each site, depending on the



**Figure 1.** Incidence and Distribution of Sorghum Diseases in Western Hararge during 2012 main cropping season

**Table 1.** Incidence and Distribution of maize Diseases in Western Hararge of Oromya region During 2012 main cropping season

Location	Types of Diseases and incidence						
	Altitude (masl)	Streak virus	Mosaic virus	Grey leaf spot	Tercicum leaf blight	Phosphoria leaf spot	Rust
Rimeti	1400			32.4	50.4	32.4	92.0
Korke	1460	32.4	36.7		84.7		89.0
Milkay	1650				98.8		98.2
Gadullo	1620				63.6		77.7
Kortu	1735						
Jilbo	1850				67.2		
Mean		32.4	36.7	32.4	73.0	32.4	89.0
Range					48.0		20.5

availability of crops. Random sampling techniques were used to evaluate the samples. Five samples from two diagonal selected sides were taken and from each 10m<sup>2</sup> area ten plants were evaluated for their diseases.

#### Disease assessment

Disease incidence data were transformed with square root transformation. Disease severity, area of plant tissue diseased, was rated on 10 randomly selected plants using standard scales of 1-9 (CIAT, 1987) where 1 is no visible disease symptom and 9 is disease covering more than 25% of the foliar tissue. The severity grades were converted into percentage severity index (PSI) (Wheeler, 1969).

$$PSI = \frac{\text{Sum of numerical ratings} \times 100}{\text{No of plants scored} \times \text{maximum score on scale}}$$

To obtain the variation between the surveyed diseases, descriptive statistics were used. Any unknown disease samples were collected and put in paper bags for further inspection in the laboratory.

## RESULTS AND DISCUSSION

### Foliar diseases

#### Sorghum diseases

Several diseases attack sorghum during its growth stage. About 47 types of diseases are recorded on sorghum in

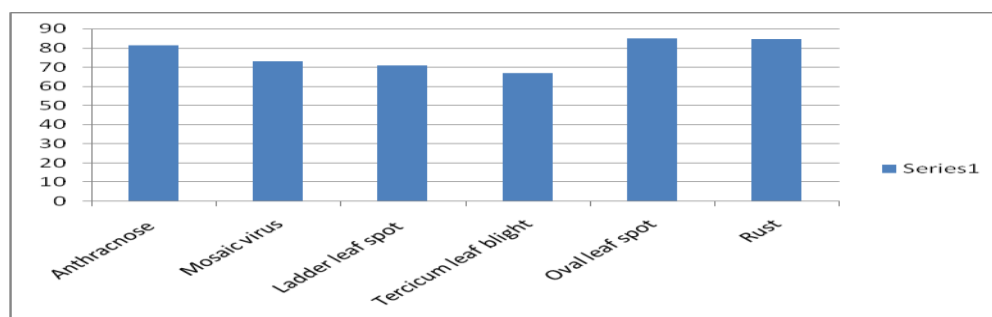
the country; foliar and panicle diseases being most important once. Most foliar diseases are fungal, bacterial and viral, while the panicle diseases are fungal. The major foliar diseases are anthracnose, leaf blight, rust, oval leaf spot and bacterial streak, while the panicle diseases are long smuts, covered smuts, loose smut and head smut (Dogget, 1988). In this survey, it was observed that anthracnose and late blight are prevalent diseases in the Darolebu district, west Hararge zone with high severity and incidence. Long and covered smuts are also important in the areas with limited incidence and severity (Table 1).

#### Anthracnose

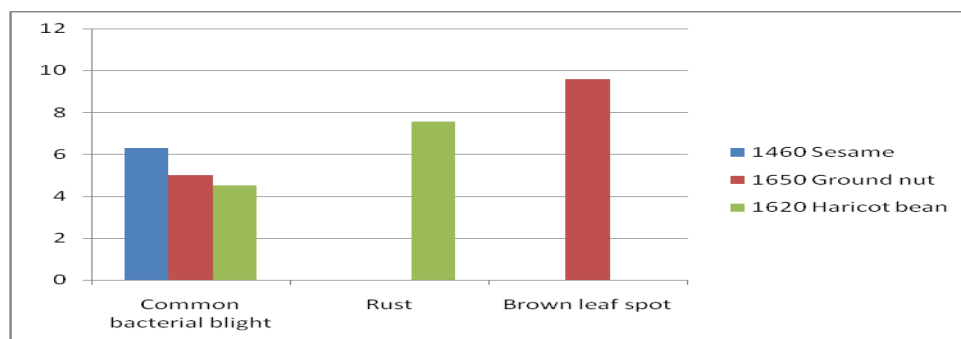
Anthracnose caused by *Colletotricum graminicola* is an important disease of sorghum in major sorghum growing areas of the country. It is more prevalent in warm, humid regions of Ethiopia. The pathogen infects grain, leaves, stalk and peduncle of sorghum (Frederikson, 1980). In this study, high disease prevalence and severity were observed. In this district, anthracnose was predominant with a mean incidence of 85.5% followed by turcicum leaf blight (73%) (Table 1). The mean disease severity of anthracnose was about 63%. Most of the local varieties are susceptible; newly tested materials showed better performance.

#### Leaf blight

Late blight caused by *Exserchilum turcicum* Le. is also an important foliar disease of sorghum that causes seed rot and seedling blight when it is planted in cold wet soil (Fekede and Kedir, 2000). Meanwhile, most of the



**Figure 2.** Incidence and Distribution of maize- sorghum inter cropped Diseases in Western Hararge of Oromiya region During 2012 main cropping season.



**Figure 3.** Incidence and Distribution of sesame and Haricot bean Diseases in Western Hararge of Oromiya region During 2012 main cropping season

farmers in the region used to grow local landraces. Those materials are highly susceptible to blight when the season is conducive to the development of disease. In this cropping season the weather condition was favorable and the highest leaf blight severity and incidence were recorded. In this district, bacterial blight is predominant with a mean incidence of 77.6%, followed by turicum leaf blight (73.0%) (Table 1). The mean disease severity of both bacterial blight and turicum leaf 56% and 27% respectively.

#### Rust

Leaf rust of sorghum caused by *Puccinia purpurea* is one of the major diseases of sorghum (Mengistu, 1982 and Tarr, 1962). The disease often appears relatively late in the growing season and seldom causes much loss in grain yield. On station lower disease incidence and severity was observed while on the farmers' field higher disease intensity was recorded on specific fields. In this district the mean disease incidence and severity of leaf rust were 36% and 27% respectively.

#### Oval leaf spot

The disease is caused by *Ramulispora sorgicola* and found in the most of the local sorghum land races grown on the newly formed woreda around Shenen River.

#### Bacterial streak and stripes

The diseases are caused by *Xanthomonas holcicola* (streak) and *pseudomonas andropogonii* (stripes). These diseases were recorded with very low disease intensity on very limited localities in the woreda (Table 1).

#### Maize diseases

##### Turicum leaf blight (TLB)

Turicum leaf blight (TLB) caused by *Exserohilum turcicum* (pass) Leonards and Suggs, is one of the major maize diseases having wider distribution and high economic importance in Ethiopia and the infection appears during both the off and main seasons but it is more during the main season in constantly wet and humid areas (Tewabeche *et al*, 2001). In western hararge, Darolebu district high incidence and severity of TLB were recorded in all kebelles. In most cases, TLB was intense on almost all varieties with a mean incidence and severity of 73% and 61.2% (Figure 2).

##### Common leaf rust (CLR)

The occurrence of the disease was found to be very sporadic. This year, Common leaf rust on maize was

predominant with a mean incidence and severity of 89.7% and 66 % (Figure 3).

#### Viral disease of maize

Very low disease severity was observed at Darolebu district. Similarly, the occurrence of maize virus has reported (Alemu *et al.*, 1999)

#### Ground nut disease

Groundnut is one of a potential cash crop legume to Darolebu and it grows as sole or inter cropped with other crops such as sorghum. The crop was highly infested with at all growth stages. In some of the fields total crop failure was observed. The major disease symptom observed were foliar and root rot. The disease intensity was very severe at farmer's field as well as on station. Brown leaf spot and root diseases were recorded on ground nut with mean incidence (10%) and severity of 93%.

#### Haricot bean diseases

Haricot bean is the next potential crop after ground nut and it grows as sole / inter cropped with sorghum or maize. Both on station and farmers field were highly infected by common bacterial blight.

#### Hot pepper disease

Fusarium wilt disease was observed on hot pepper.

#### Sesame disease

Bacterial blight was detected at relatively low level on farmer's field near the newly formed woreda.

#### Panicle diseases

Sorghum diseases: long, covered, loose and head smut. All these types of smuts were recorded.

### CONCLUSION AND RECOMMENDATION

In this survey 14 sites and more than 175 km were covered in Darolebu district. Over 25 sampled areas covered and 9 crops (sorghum, maize, haricot bean, sweet potato, ground nut, hot pepper, sesame and tef were investigated for diseases damage. From this study detected that diseases are among the major production constraint of the woreda. Therefore, urgent control measure should be taken to save the crop. On foliar disease aspect TLB and rust on maize; anthracnose, turicum leaf blight, smuts and rust on sorghum and brown leaf spot and root disease were also recorded on

ground nut. Bacterial blight was serious on haricot bean. In general farmers do not use improved technologies. Hence, there is a need to introduce improved disease management techniques such as using resistant varieties, cultural and chemicals to be incorporated in the Integrated Disease Management (IDM) practices.

### REFERENCES

- Alemu L, Adena A, Berhanu B, Mesfin T (1999). Identification of virus in Maize and grass hosts. *Pest Management Journal of Ethiopia*. 1:73-76.
- CIAT (1987). Center Internacional De Agricultura Tropical. Standard System for the Evaluation of Bean Germplam. CIAT, Cali Colombia.
- Dogget (1988). *Sorghum Tropical Africa Series*. New York, USA. Longman Scientific and Technical, John Willey and sons. 512Pp.
- Eshetu B, Temam H, Sakhuja PK (2006). Yield loss in sorghum due to covered kernel smut in North east Ethiopia. *Pest Management Journal of Ethiopia*. 10:61-67.
- Fekede A, Kedir W (2000). Paper presented in crop in protection society in eight annual conferences.
- Frederiksen RA (1980). Sorghum Leaf Blight. Pages 243-248 *In: Sorghum Diseases: A World Review. International Crops Research Institute for the semi-Arid Tropics*, Patancheru, India.
- Mengistu H (1982). *Disease of sorghum at some locations in Ethiopia*. *Ethiopian Journal of Agricultural Sciences* 4:45-54.
- Tarr SA (1962). *Diseases of sorghum, Sudan Grass and Broom corn*. Common Mycological Institute, Kew, Surrey, England. 380 pp.
- Tewabech T, Getachew A, Fekede A, Dagne W (2001). Maize Pathology in Ethiopia: A review *In: Mandefro Nigussie, D. Tanner and S. Twmasi-Afrie. (eds.) Proc. of the 2<sup>nd</sup> National Maize Workshop of Ethiopia/CIMMYT*
- Wheeler BEJ (1969). *An Introduction to Plant Diseases*. Wiley, London, pp. 347.

Accepted 02 July, 2015.

**Citation:** Emana BT (2014). Survey of diseases of major crops in Darolebu district, West Hararge, Ethiopia. *International Journal of Plant Breeding and Crop Science*, 2(2): 043-045.



**Copyright:** © 2015 Emana BT. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are cited.