Materials and Methods

Survey of tef diseases

Tef diseases survey was conducted during 2016 cropping season in five major tef producing Zones of Oromia and Southern Nation and Nationality of People (SNNP) regions were assessed. A total of 41 fields were assessed in 19 districts were observed. Three to five stops were made in each Tef field along a diagonal move at each stop interval. During the survey crop growth stage was not the same. The survey was conducted during crop growth stage of grain filling, heading and maturity based on agro ecologies of the surveyed areas. Disease prevalence, incidence and severity were recorded for tef leaf rust and smut. The disease prevalence was calculated using the number of fields affected divided by the total number of fields assessed and expressed in percentage. Incidence was calculated by using the number of plants infected and expressed as percentage of the total number of plants assessed. Severity was scored visually using the modified Cobb's Scale:

Where:

0% = immune

100% = completely susceptible

Peterson et al. [6] but there was no immune response for the reaction between tef varieties and the tef rust disease. There were no resistant and moderately resistant responses of tef varieties across the surveyed areas. For smut disease incidence was taken. Three survey routes were done based on the most tef growing regions and suitable for the occurrence of major tef diseases. Trips were arranged based on the crop growth stage and the disease occurrence. The surveys were made following the main roads and accessible routes in each survey district, and stops were made at every 5-10 km intervals based on vehicles odometers and on the availability of tef in the farmers' field.

The tef diseases incidence and severity of each field was computed from five stops. The results of the survey were summarized by districts and varieties. The geographic coordinates (latitude and longitude), and altitude were recorded using Geographic Positioning System (GPS) unit. The latitude and longitude coordinates were used to map the distribution of the tef leaf rust and other tef diseases in the surveyed areas using the Environmental Systems Research Institute (ESRI) Arc View 3.0.

Results and Discussions

Survey of Tef diseases

Tef diseases survey was conducted in Oromia, Amhara and Southern Nation and Nationality of People (SNNP) regions have been presented in Table 1. The diseases survey covered seven zones namely West Arsi, South West Shoa, East Shoa, North Shoa, Gurage, Silte and Hadiya in twenty-nine districts. The distributions and intensities of the tef leaf rust disease were observed in all surveyed districts at variable levels of surveyed fields depending on the agro-ecologies and varieties grown.

Table 1: Geographical distribution, incidence and severity of tef leaf rust disease in 2016 main growing seasons.

Zones	Districts	Total fields	Infected Fields	Tef leaf rust			Altitude
				Prevalence	Incidence	Severity	
South West Shoa	Ilu	2	2	100	90	10S-20MS	1823-2351
	Becho	2	2	100	100	10-15MS	
	Woliso	4	4	100	80	10MS-15S	
	Goro	2	2	100	100	20S, 20MS	
Gurage	Kobena	1	1	100	100	25S	1912-2352
	Gubare	1	1	100	60	30S	
	Agena	2	2	100	100	10MS-35S	
	Meskan	5	5	100	100	30-60S	
	Atu	1	1	100	100	50S	
	Sodo	1	1	100	100	40S	
Silte	Worabe	6	6	100	80	30-50S	1877-2231
	Sankura	3	3	100	100	30S-50S	
	Wulbarak	1	1	100	100	20MS	
Hadiya	Anlemo	1	1	100	80	20MS	1998-2251
	Analemu	2	2	100	100	25-40S	1763-1970
	Lemu	1	1	100	80	20MS	
West Arsi	Shashemene	2	2	100	100	20-50S	
	Wondo Genet	2	2	100	80	30S	
	Arsi Negelle	2	2	100	90	10-30MS	
Total	19	41	41				

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