Research in Plant Sciences, 2015, Vol. 3, No. 3, 61-67
Available online at http://pubs.sciepub.com/plant/3/3/3

DOI:10.12691/plant-3-3-3

Estimated Yield Loss Assessment of Bread Wheat (*Triticumaestivum L.*) due to Septoria Leaf Blotch *Septariatritici* (Roberge in Desmaz) on Wheat in Holeta Agricultural Research Center, West Shewa, Ethiopia

Abera Takele[1], Alemu lencho[1,*], Bekele Kassa[2], Getaneh W/Ab[3], Endale Hailu[2]

[1]College of Agriculture and Veterinary, Plant Sciences Department Ambo University, Ethiopia
[2]Ethiopian Institute of Agricultural Research Holeta Agricultural Research Center, Addis Ababa
[3]Ethiopian Institute of Agricultural Research, Ambo Plant protection Research Center, Ambo
*Corresponding author: alemulencho@yahoo.com

Abstract Septoria leaf blotch is one of the most important yield limiting diseases of wheat world wide. Yield loss assessment was conducted in Randomized Complete Block Design (RCBD) in pair treatment (sprayed versus unsprayed), with four replications at Holeta Agricultural Research Center experimental field during the main cropping season of 2014. A susceptible bread wheat variety 'Huluka' and systemic fungicide Propicanazole, (Tilt-250 E.C), at the rate of 0.5 l/ha was used under natural infections. Evaluation was started from the onset of the disease 62 days after planting (DAP). The initial incidence and severity of disease treated and untreated plots were similar with incidence of 22.5 and 20and Severity of 6.6 % and 5.6 % respectively. However at 110 DAP, the incidence and severity of treated plots were 25and 4.3, while that of untreated plots were 100 and 95% respectively. The effects of Septoria leaf blotch on grain yield was significant ($P<0.05$) when the treated (5626.kg/ha) was compared with the un treated plots (3324.3 kg/ha). Yield loss in grain yield was estimated to be 41%. Disease parameters like disease incidence, severity and the area under disease progress curves (AUDPC) were negatively correlated with yield and yield components, whereas, yield components were positively correlated with yield. Data on cost benefit analysis showed that, the highest net return benefit was obtained from fungicide treated plots with mean value of 46018.80 Ethiopian birr/ha^{-1}. While the least net return was obtained from untreated plots with a value of 26280.85birr/ha. The marginal value also indicated that, the highest marginal rate of return (926%) was obtained from treated plots when compared with untreated plots. There is a need to assess further pathogen variability's and subsequently to screen resistant varieties against the Septoria leaf blotch. In absence of other options yet farming communities need to be advised on timely application of efficient fungicides against the pathogen that may lead to utilization of integrated diseases management.

Keywords: *bread wheat, Septoria leaf blotch disease, yield loss, fungicide, Propicanazole*

Cite This Article: Abera Takele, Alemu lencho, Bekele Kassa, Getaneh W/Ab, and Endale Hailu, "Estimated Yield Loss Assessment of Bread Wheat (*Triticumaestivum L.*) due to Septoria Leaf Blotch *Septariatritici* (Roberge in Desmaz) on Wheat in Holeta Agricultural Research Center, West Shewa, Ethiopia." *Research in Plant Sciences*, vol. 3, no. 3 (2015): 61-67. doi: 10.12691/plant-3-3-3.

1. Introduction

Bread wheat (*Triticumaestivum L.)* is the most important small graincereals produced worldwide. Ethiopia is the second largest wheat producing country in Africa after South Africa [4,6]. South–West and West Shewa zones are one of the most important wheat producing area of Oromia Regional State where the crop has been selected as one of the target crops in the strategic goal of attaining regional food security. The area under wheat cultivation has been increased for the last few years. However, the production and productivity of the crop in Ethiopia in general and Oromia Region in particular is still low [5]. The yield limiting including biotic (diseases, insects and weeds), abiotic (drought, acidity, alkalinity, extreme temperature, depleted soil fertility) and low adoption of new technologies. Among the diseases; Septoria leaf blotch (SLB) (*Septiriatritici Roberge* in Desmaz,) *Mycosphaerella graminicola* (Fuckel) Schroeter (anamorph: *Septoriatritici)* is one of the most important yield limiting diseases of wheat worldwide [9,10].

Fungicides application and the development of resistant wheat cultivars are the strategies to alleviate SLB [9]. The timing and number of fungicide application are crucial in crop protection approach. It has been reported that sprays applied during the period from flag leaf to ear emergence had shown effective control of septoria [3]. However, the number of the fungicide depends on environmental conditions and disease the occurrence, severity, incidence and critical threshold levels of disease development. Fungicides have become an integral component of disease management program in many countries of the world [3]. In addition to the use of resistant varieties offer a good protection and prevent yield losses and also effectively improve productivity of wheat in areas to prone to SLB [12].

Field surveys conducted earlier in Ethiopia, revealed that SLB was found to be one of the most important diseases in wheat. The Holeta Agricultural Research Center is located in the high lands is designated as a 'hot spot, for Septoria diseases where 80-98 % incidences and 25% yieldloss was reported in susceptible wheat varieties [7,8,16]. Occasional assessment of the disease is essential for timely devising the control measures. Despite frequent occurrence of severe epidemics of SLB leaf blotch disease in the location, specific information on the yield loss inflicted due to this diseases is scanty as of today.

2. Materials and Methods

2.1. Description of the Study Areas

The yield loss assessment due to SLB was conducted at Holeta Agricultural Research Center (HARC) experiment al field, during the main cropping season of 2014. The altitude of the center is 2400 m. a. s. l, with geographical positions of 09° 40-N and E 038° 29E. The annual rainfall ranges from

1000-1588mm and the rainy season was from June to October, with an average of 15.65°C temperature at center and the range was between 6.5°C and 25.3°C, The maximium rainfall was 94.3mm and the minimum was 2.3mm.

2.2. Experimental Design

The experiment was arranged in a Randomized Complete Block Design (RCBD) with four replications and fungicide Propiconazole (Tilt: 250E.C) treated versus notun treated. Susceptible bread wheat variety' Huluka' seeds were sown at the rate of 100 kg/ha. Plot size was 5m x 4 m = 20m^2 /treatments with a total plot size of 160 m^2 was used. The spacing between plots, rows and blocks were 1m, 20cm, 3m, respectively. Each experimental plot consisted of 20 rows, and the 18 central rows were harvested. The fungicide treated at the rate of 0.5 l /hain 200L/ha of water was applied at 16days interval using Knapsack sprayer against Septoria leaf blotch afterthe occurrence of distinctive symptoms. A total of four spray frequencies of were made during vegetative stage and all cultural and agronomic practices were supplemented as per the local recommendation to raise the crop.

A crop data were recorded at plant emergence starting from sowing date, 75% post emergence date, and first appearance of SLB during crop growth stages**.** Sixty plants per plot were tagged for further evaluation of disease parameters.

Disease incidence and severity index, plant height, spike length, number of kernel per spike, yield per plot, yield per hectare, heading date, thousand seed weight (g) and hectoliter weight were measured.

Disease intensity: the experiment was conducted under natural infections and disease incidence and severity were assessed on the central 18 rows every sixteen days starting from the first occurrence of disease symptoms up to maturity of the crop. Incidence of SLB was assessed by counting the number of infected plants in the middle 18 rows and was expressed as percentage of total plants infected. Following the data recording, plants were sprayed with the fungicide and disease recording were made throughout the experimentation.

Disease incidence (%)

$$= \frac{\text{Number of Septoria leaf blotch infected plants}}{\text{Total number of inspected plants}} \text{x100}$$

$$\textbf{Severityindex}(\%) = \mathrm{D1/9 \times D2/9 \times 100}$$

The first digit (**D1**) indicates vertical disease progress on the plant and the second digit (**D2**) refers to severity measured as diseased leaf area.

2.3. Area under Disease Progress Curve

Area under Disease Progress Curve (**AUDPC)** and growth curve models were developed for disease progress data. **AUDP**C values were calculated for each plot using the equations developed by Sharma and Duveiller [19].

$$AUDPC = \sum_{i=1}^{n-1} 0.5\left(x_{i+1} + x_i\right)\left(t_{i+1} - t_i\right)$$

Where X is the cumulative disease severity expressed as a proportion at the **ith** Observation, **t_i**= is the time (days after planting) at the **ith** observation and **n -** total number of observation. Since *Septoriatritici* severity was expression percent and time **(t)** in days [10].

The data was regressed over time to determine the model. To evaluate disease progress considering wheat plants structure was used Septoria Progress Coefficient (SPC) as per the formula of [10]: SPC = disease height (cm)/Plant height (cm). The correlation coefficient (r) was also calculated as described earlier by Pearson and Hartley [17].

2.4. Assessment of Yield and Yield Components

The thousand seed weight, grain yield ha^{-1}, hectoliter weight, kernels weight per spike, number of kernels per spike, spike length and plant height of treated and untreated plants were recorded.

2.5. Yield Loss Estimation

Yield losses due to SLB of the treated versus untreated were computed as per the equations

$$\mathrm{RL\%} = \frac{\left(\mathrm{Y_1 - Y_2}\right)}{\mathrm{Y_1}}\text{x100}$$

Where: RL- relative loss (reduction of the parameters yield and yield components), Y1- mean of the respective parameters in protected plot (plots with maximum protection) and Y2 –mean of the respective parameters in unprotected plots. Relative percent hectoliter weight loss (L) due to Septoria leaf blotch was calculated using previously established formula.

$$\mathbf{L}(\%) = \left[\left(\mathrm{Y_{mt} - Y_{lt}}\right) \text{ x } 100 / \mathrm{Ybt}\right]$$

Where Y_{mt} is the hectoliter weight from the maximum protected plot and Y_{lt} is the yield from unsprayed plots.

2.6. Cost Benefit Analysis

Price of wheat grains (Ethiopian birr/kg) was computed based on the current local market, total price of 100kg obtained from a hectare basis, input costs like fungicides and labor costs /ha were taken into account. The total amount of these materials used for the experiments were computed and its price converted. Before doing the economic analysis (partial budget), the statistical analysis was done on the collected data to compare the average yield between treated and untreated respectively. The deference between treatments and the economic data were subjected to analysis using the partial budget analysis method [2]. Marginal rate of return was calculated using the formula:

$$MRR\,(\%) = \frac{DNI}{DIC} \text{ x } 100$$

Where: MRR is marginal rate of returns, DNI is difference in net income compared with untreated, DIC is difference in input cost compared to untreated.

2.7. Statistical Analysis of Data

Data on disease parameters such as disease incidence, disease severity, PSI, AUDPC, disease progression (r), yield and yield components, yield loss analysis were subjected t-test using Statistical Analysis system (SAS) version 9.1 soft ware[18].

3. Results and Discussion

3.1. Yield Loss Assessment of Wheat due to SLB

3.1.1. Assessment of Wheat Septoria Leaf Blotch at Different Growth Stages

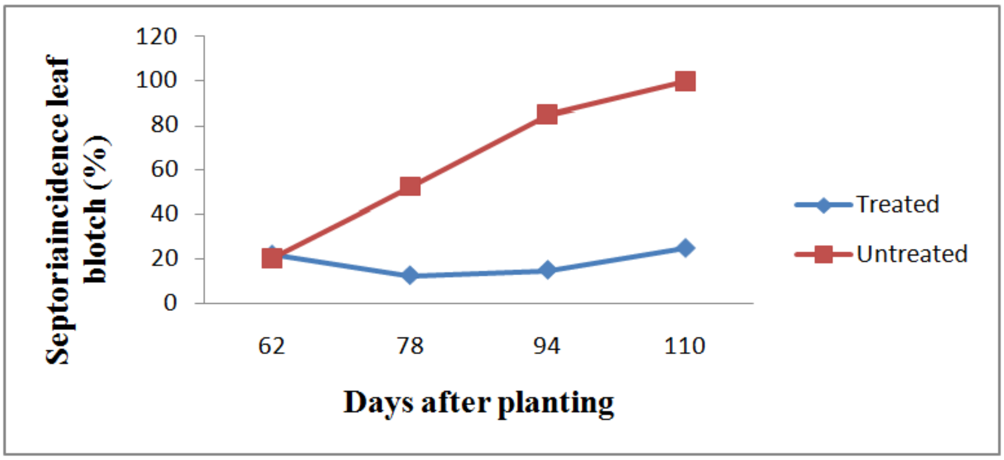

Figure 1. The progress of Septoria leaf blotch on fungicide treated and untreated plots at HARC, 2014

Disease assessment was made 62 days after planting at the time of disease onset on treated and untreated plots. An initial infection level of incidence was recorded (22.5%, 20%) and severity of (6.8%, 5.6%) in treated and untreated plots. Septoria leaf blotch incidence progress started and started after the first date of disease assessment (78, 94 and 110 DAP) and showed statistically different at ($P< 0.05$). Foliar spray of fungicides at 0.5 l/ha resulted in substantial reduction in disease incidence as observed at 78, 94 and 110days after planting in comparison with unsprayed plots. The disease incidence was reduced from 22.5% to 12.55% at 75 DAP due to fungicides spray. But there has been escalated disease incidence with crop growth stages which revealed 25% at 110 DAP relatively with 100% incidence with unsprayed plots. Severity on treated plots was also reduced significantly from 95 % to 4.5%at 110 DAP. This finding is consistent with the one reported by Eshetu and Zerihun [8] yet remained as it has been as the 'hot spot' location, probably due to favorable environmental conditions, like cool, humid, frequent rainfall, and moderate temperatures in this in central high land highland. Suffert *et. al* [20] also revealed that high relative humidity, frequent rains, and moderate temperatures were critical for SLB development (Figure 1).

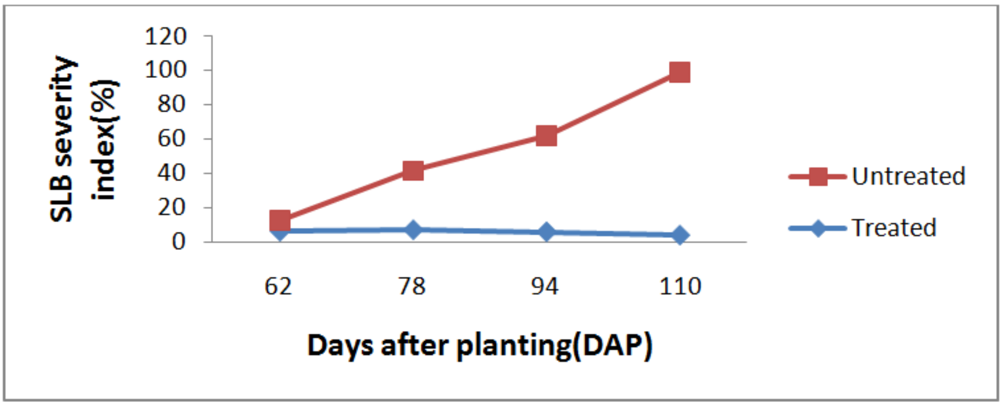

Figure 2. Septoria leaf blotch severity development on treated and untreated plants

3.1.2. Wheat Septoria Leaf Blotch Severity on Wheat

Fungicide treated plants at 0.5.l/ha had mean severity value of, 6.6% at 62 DAP (39Gs), 7.4% at 78 DAP (59Gs), 6.2% at 94 DAP (77Gs) and 4.3% at 110DAP (89Gs). While the unsprayed plots showed the maximum disease severity index for the last three successive assessment dates with the mean value of 34% at 78 DAP(59Gs), 56% at 94 DAP(77Gs), 95% at 110 DAP(89Gs).When final disease severity index was compared there was significant difference between treated and untreated plots. The least percent disease severity index was recorded in treated plots at 110 DAP, with mean value of 4.3 where as the highest severity index of 95% was recorded at final date in untreated plots. The severity of the disease was high and has been serious threat to wheat production as earlier reported by Ayele *et al* [1]. Hence, this may necessitate dependence up on the use of systemic fungicides continuously such as Propiconazole (Tilt,250% E.C) as one of the control strategies.

3.1.3. Area under Diseases Progress Curve (AUDPC)

The SLBsymptom began to appear on treated and untreated plots atthe wheat growth stages with uneven distribution of the pathogen. But gradually the disease severity became different between treated and untreated plots**.** Hence, the, minimum AUDPC of **410** was observed in treated plots and while, the maximum AUDPC value of **2275** was recorded from untreated plants (Figure 3).

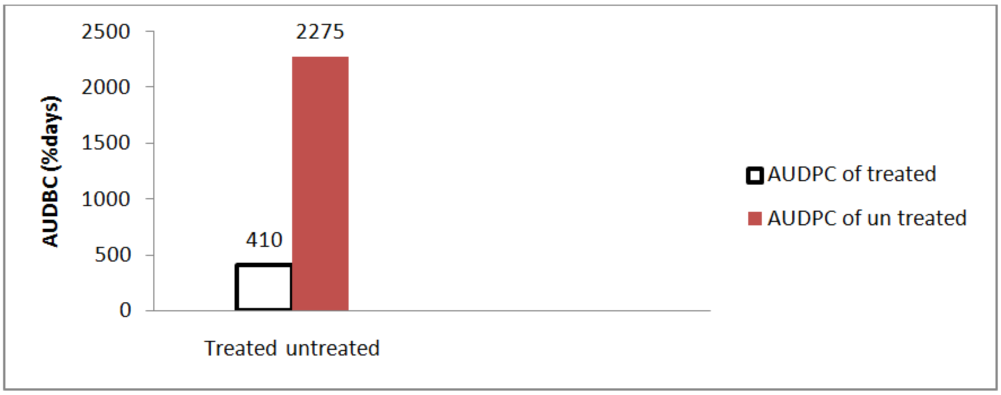

Figure 3. AUDPC of Septoria leaf blotch of Septoria leaf blotch in paired treatments plots

AUDPC values of Septoria leaf blotch showed significant difference (P>0.05) between treated and untreated plots, the highest AUDPC values result in reduction of green leaf area and increase in height of disease of Septoria leaf blotch. This principal effect of Septoria leaf blotch epidemics contributed to the observed decline in yield and yield components. In the field experiment, Septoria leaf blotch first appeared at 62 days after planting of wheat even though, the disease pressure was not uniform for treated and untreated plots.

3.1.4. Disease Progress Rate (r)

The coefficient of determination (R^2) was higher for logistic model consistently than comprtz model. Comparison between the growth models on disease progress rate of Septoriatritici blotch treated and untreated plots were made based on Logistic model. The data analyses indicated that, the logistic model was found superior in describing the progress rate of Septoria leaf blotch consistently to the comprtz model. In comparison, the coefficient of determination (R) was not equivalent for both models in all-experimental treatments. Therefore, in this experiment, comparisons of the development of disease rate between treated and untreated were subsequently made based on logistic model. Disease progress rates were significantly different as compared with the unsprayed treatment. In treatments, the acceptable regression equation with coefficient of determination (R^2) ranging from 0.52% to 0.99% was obtained with the linearized form of final Septoria leaf blotch severity regressed over time in days after planting.

The highest disease progress rate was observed in untreated plots with a value of 95%. Although, the disease progress rate of SLB increased more rapidly in untreated control compared to treated plots (Figure 4).

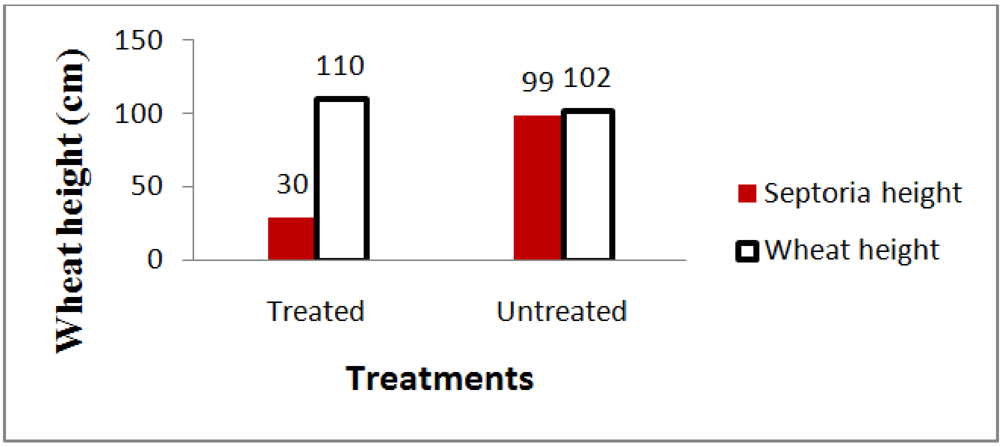

Figure 4. The progress of Septoria leaf blotch related to plant height

3.1.5. Wheat Yield and Yield Components

The Effect of SLB on grain yield, thousand seed weight and hectoliter weight.

The weight of yield per plot and per hectare was low in weight and quality for untreated plots in comparison with treated plants. In this experiment un-shriveled seeds, were classified as quality yield and shriveled seeds were classified as non-quality yield. The highest yield was harvested from fungicide treated plots with the mean yield of 5626.65Kg/ha^{-1} and the lowest yield was obtained from untreated plots with the mean yield value of 3324.3Kg/ha (Table 1).

The weight of 1000seeds recorded from both sprayed and unsprayed plots (Table 1) revealed that the fungicide treated plot had a range of 42- 44 g and the un untreated plots had 29-31g. The average mean of 1000 seed weight was 30.13g for unsprayed plots and 43 for sprayed plots**.** The sprayed plots in the present study is categorized under medium thousand seed weight with mean value of 43g, whereas, the unsprayed plots revealed a mean value of 30.13g. According to this result, the Septoria leaf blotch had effect on the weight of the seed and the cultivar Huluka was found to be susceptible to SLB. The thousand seed weight loss recorded from this experiment was 33%. This result is also consistent with Zadoks [22] who, indicated that the fungicide application this fungicide has had significantly increased kernel weight.

The mean hectoliter weight (HLW) is used in Brazil for classifying wheat into types, and 78.0 Kg/h^{-1} is the minimum weight required to be classified as Type1 and below that Type 2 (Geovana *et al*, [12]. The mean HLW of the wheat grain in this experiment was 80.3kg/hl and experiment varied from 76.0 to 81.4 kg/hl in sprayed plots. The highest HLW was recorded from sprayed plots with the average mean of 80.82 kg/hl and was classified as Type1 and the unsprayed plots recorded lower with mean of 76.78 kg/hl and have classified as Type 2. These results agree with those earlier reported by Mariana *et al* [15] who found HLW ranging from 74.7 to 80.0 kg/hl. Similarly Gutkoski *et al* [13] reported HLW ranging from 74.3 to 80.1 kg/hl from unsprayed and sprayed plots, respectively. The hectoliter weight loss recorded from this experiment was 5 % (Table 1).

The effect of Septoria leaf blotch on number of kernels per spike, kernel weight per spike, Plant Height and Spike length

In this study the, number of kernel per spike significantly varied with Septoria incidence. The highest number of kernels per spike was recorded from fungicide treated plots with mean of 64 (range 57-69). The lowest number of kernel per spike was recorded from unsprayed plots with mean kernels per spike of 50 (ranged 46-53). The estimated reduction of 25% in kernels weight was recorded from untreated plots. Elucidating that the SLB had deleterious effect on number of grains per spike (Table 1).

The highest kernel weight per spike was obtained from fungicide sprayed plot with range of 2- 2.4 g and the contrary the lowest kernels weight per spike was obtained from unsprayed plots with range of 1.2 to 1.4g. In general, the mean kernels weight per spike was 1.3gm for unsprayed and 2.3gm for sprayed plots This result is in line with, Zadoks [22] who reported that, as disease severity increases the kernel weight per spike decreases. The kernel weight per spike loss from this experiment was 43.5% and fungicide application.

Both plant height and spike lengths were adversely affected in untreated plots. Plant height and spike length measured on sprayed plots were larger than those from unsprayed plots. Height measurements of plant and spike length on sprayed plots, ranged from 106-110cm with mean values of 108.5cm.While, the plant height and spike length measured from unsprayed plots were smaller than sprayed plots, which ranged from 99-102cm and 10-11cm with mean values of 100.5cm and 10.4 cm. The results showed that, under severe Septoria leaf blotch infection the plant height and spike length were affected. Earlier findings showed that under severe SLB infection insusceptible variety, have effect on plant height and other yield components [10]. The plant height and spike length obtained from all treated plots were significantly higher than that of untreated plots. This indicated that, SLB has a great effect upon plant growth and spike length (Table 1).

Table 1.Yield and yield components loss estimation of wheat due to SLB sprayed versus untreated

Treatment	AUDPC	Yield (kg/ha)	TSW(g)	HLW(g)	WKS^{-1}(g)	NKS^{-1}(g)	SL(cm)	PH(cm)
Sprayed	410.4	5626.4	45	80.825	2.3	65	12.39	108.5
Unsprayed	2275	3324.3	29	76.775	1.3	49	10.4	100.5
Loss%	---	41	36	5	43.5	25	16	7.4
CV%	9.47	6.64	2.9	0.89	6.85	4.96	4.7	1.66

TSW: Thousand seed weight, **HLW**: Hectoliter weight, **WKS**$^{-1}$: Kernel weight per spike, **NKS**$^{-1}$: Number of kernels per spike, **PH**: Plant height and SL: Spike length.

Yield loss estimation

The variation in yield and yield component, losses were observed between paired treatments. In untreated plots, the yield of thousand seed weight, hectoliter weight, weight of kernel per spike, kernel number per spike, spike length and plant height losses were distinctly higher than in protected plots. Yield and yield components losses were substantially, reduced with the application of fungicide relative to untreated plots**.** The yield, thousand seed weight, hectoliter weight, weight of kernel per spike, kernel number per spike, spike length and plant height losses, due to Septoria leaf blotch were 41, 36, 5, 43.5, 25, 16 and 7.4%, respectively when compared with protected plots with spray frequency of 16 days. The degree of variation between the two treatments in grain yield, thousand seed weight, weight of kernel per spike, kernel number per spike and spike length were highly significant on untreated plots. The disease development was highest (AUDPC=2275) in untreated plots. Nevertheless, the variations between the two treatments in hectoliter weight and plant height were significant. This result is in agreement with experiments previously conducted by Thomas *et.al* [21] as SLB can cause serious yield losses which ranging from 31 to 60 % worldwide and 25% in Ethiopia [16]. The results obtained in this experiment were found to be within the ranges of worldwide yield loss and more than the previously reported yield loss estimated in Ethiopia. Hence, this experiment by far substantiated the perception of yield losses of Septoria leaf blotch disease that, is yet threatening pathogen with updated information (Table 1).

3.1.6. Correlation Coefficient (r) between Yield, Yield Component and Disease Parameters

Wheat yield was correlated with different disease parameters and their parameters were correlated among each other. Disease incidence was positively and significantly correlated with disease severity and AUDPC.

Simultaneously, disease incidence was negatively and significantly correlated with yield, spike length, plant height, weight of kernel per spike, kernel number per spike, thousand seed weight and hectoliter weight (Table 2). Disease severity exhibited highly positively significant correlation with AUDPC. Severity, incidence and AUDPC also showed highly significant negatively correlated with yield and spike length, plant height, weight of kernel per spike, kernel number per spike, thousand seed weight and hectoliter weight. Generally, disease parameters recorded positive correlated among each other. The highest value of correlation coefficient indicated strong relationships between and within disease parameters. James, [14], Forrer and Zadoks [11] also observed that the greatest risk to wheat crop occur when conducive environmental factors favor spore dispersal during and shortly after flag leaf emergence, and the crop losses have been related to total leaf area infected including necrotic lesions and chlorotic flakes, and hence these events were highly correlated with reduction of spike length, plant height, weight of kernel per spike, kernel number per spike and thousand seed weight.

Table 2. Correlation coefficient (r) between yield, yield components and disease parameters

Disease parameter	Incidence	Severity	HLW	TSW	Yield	K NS	KWS	PH	SL	AUDPC	DH
Incidence	_	0.99**	-0.97**	-0.97**	-0.92**	-0.86**	-0.97**	-0.93**	-0.36*	0.99**	0.99**
Severity		_	-0.97**	-0.97**	-0.92**	-0.84**	-0.97**	-0.95**	-0.4*	0.99**	0.98**
HLW			_	0.99**	0.88**	0.87**	0.98**	0.93**	0.43*	-0.96**	-0.97**
TSW				_	0.92**	0.89**	0.98**	0.97**	0.49**	-0.97**	-0.97**
Yield					_	0.75**	0.93**	0.93**	0.63**	-0.93**	-0.91**
KNS						_	0.79**	0.85**	0.23	-0.84**	-0.90**
WKS							_	0.93**	0.51**	-0.97**	-0.96**
PH								_	0.51**	-0.95**	-0.93**
SL									_	-0.40 *	-0.36*
AUDPC										---	0.99**
DH											---

HLW: Hectoliter weight, **TSW**: Thousand seed weight, **KNS:** Kernel number per spike, **KWS**: Kernel weight per spike, **PH**: Plant Height, **SL**: Spike length, **DH**: Disease height, **DPR**: Disease progress rate and AUDPC: Area under disease progress curve.

3.1.7. Cost Benefit Analysis

The data indicated that fungicide treated plots have recorded the highest total variable costs than untreated. Likewise, minimum variable costs were observed in untreated plots. Nevertheless, the highest gross return was obtained (53450)from fungicide treated plots. In addition, the data analyses indicated that the highest net return was also obtained from treated plots with mean value of 46018 birr/hectare. The least net benefit was obtained from untreated plots with a value of 26280 birr/ha. On the other hand, marginal analysis indicated that the highest marginal rate of return (926%) was obtained from treated plots when compared with untreated plots (Table 3).

Table 3. Partial budget analysis of fungicide treated and untreated plots

	Parameters	**Unit**	**Untreated**	**Treated**
1	Wheat yield	Kg	3324.3	5626.40
2	Wheat sale price	Birr/kg	9.50	9.50
3	Total Sale revenue	Birr/ha	31580.85	53450.80
4	Input and labor cost	Birr/kg	5300	7432
5	Marginal cost	Birr/kg	---	2132
6	Net benefit	Birr/ha	26280.85	46018.80
7	Marginal benefit	Birr/kg	-----	19737.95
8	Marginal Rate of Return	%	--	926
9	Cost benefit ratio	CBR	--	6.19

4. Conclusions

Septoria leaf blotch resulted in significant yield loss of bread wheat variety) in Holeta Agricultural Research Center, Ethiopia. The fungicide treated plots had significantly reduced SLB severity relatively to untreated plots with values of 4.3 and 94.5%, respectively. The efficacy of Propiconazole to control the Septoria leaf blotch has been well verified due to this study. The Bead wheat yield loss due to this disease was 41%atHoleta Agricultural Research Center, West Shewa, Ethiopia.

5. Recommendation

The diseases variability's and Screening of resistant varieties against the Septoria leaf blotch need to due to attention. The farming communities should be trained and/or advised on timely application of efficient fungicides against the that may lead to utilization of integrated diseases management strategy.

References

[1] Ayele Badebo and Temesgen Kebede. Review of relative infection of Research on Diseases of small cereals crops *in:* Abraham Tadesse (*ed*). Increasing crop production through improved plant protection. *Vol I*. pp-375-418. 2008.

[2] CIMMYT. Farm agronomic data to farmer's recommendations a training manual completely revised edition international maize and wheat center, Mexico. 170 pp. 1988

[3] Cook, RJHims, MJ and Vaughan. TB Effects of fungicide spray timing on winter wheat disease control. Plant Pathology 48:33-50. 1999.

[4] Curtis, BC Rajaram S and HG Macpherson (eds). Bread wheat Improvement and production No. 30. Food and Agriculture Organization of the United Nations, Rome Italy 554 pp. 2002.

[5] Central Statistical Agency (CSA). Crop Production Forecast Sample Survey for the year 2013/2014. Report on Area and Crop Production forecast for Major Crops (For Private Peasant Holding, Meher Season) Addis Ababa, Ethiopia, 7-10. 2013.

[6] CSA.Agricultural sample survey: Report on area and production for major crops. Statistical Bulletin. Addis Ababa, Ethiopia. 388pp. 2012.

[7] EshetuBekele and Zerihun Kassaye. Integrated management of septoria blotch of wheat: Effects of sowing date. Variety and fungicide Pest *mgt. J*. Eth. 7:11-18. 1986.

[8] Eshetu Bekele. Review of research on disease of barley, teff and wheat in Ethiopia. *In* (Tsedeke Abate (*ed*). A review of Crop protection Research in Ethiopia. Proceedings of the first crop protection Symposium. IAR Addis Ababa Ethiopia. pp79-108. 1985.

[9] Eyal Z.Scharen AL Prescott JM and GinkelM.van. The Septoria diseases of wheat: Concepts and methods of disease management. CIMMYT. Mexico, D.F.63:1087-1091. 1987.

[10] Eyal Z. and Ziv. O. The relationship between epidemics of Septoria leaf blotch and yield losses in spring wheat. Physiopathology 64: 1385- 1389. 1974.

[11] Forrer HR and Zadoks JC. Yield reduction in wheat in relation to leaf necrosis caused by Septoriatritici. *Neth.J. PlantPathol*. 89:87-98. 1983.

[12] Geovana D; SaviKarim C. Piacentini, Casiane. STibola and Vildes M. Scussel. Mycoflora and dexynialenol in whole wheat grains *(Tricumaestivium* from southern Brazile. Food additives and contaminants part B, Vol 7.No.3.pp232-237. 2010

[13] Gutkoski Luiz Carlos; Angelise DURIGON, Simone MAZZUTTI, AmiltonCe' sarTelo da SILVA, Moacr Cardoso ELIAS, Effects of the maturation period of grains on the physical and Phynological properties of wheats. Technol. Alemnt. Campan as 28(4) 888-894. 2007.

[14] James WC. Assessment of Plant Diseases and Losses. Ann. Rev. Phytopathol., 12:2748. 1974.

[15] Mariana Souza Costa, Maria Brigida dos Santos Scholz, Celia Maria Landi Franko. Effect of high and low molecular weight gluten in subunits and subunits of gliadin on physiochemical parameters of different wheat genotypes. Technol.Alement, Campinas 33(sup l.1): 163-170. 2012.

[16] Mengeistu Huluka, Getaneh WeldeAb, Yeshi Adenew Rebika Desta and Ayele Badebo, (1991). Wheat pathology research in Ethiopia *In*: Hailu Gebremariam, Tanner D.G, and Mengestu Huluka (*eds*). Wheat research in Ethiopia. A historical prospective. Addis Ababa, IAR / CIMMYT. pp173-217. 1991.

[17] Pearson E.M. and Hartley O., (1970). Biometrial tables for statisticians. The 3th edition, Vol. No. I, New York, Cambridge University Press, pp12-18.

[18] SAS institute INC.SAS/stat guide for personal computer. version, 9.0 editions. SAS InstituteInc,carry,NC.2002

[19] Sharma RC and Duveiller E.. Advancement toward new Septoria Blotch resistance Wheat's in south Asia. *Crop Sci*. 47:961-968. 2007

[20] Suffert, F., I. Sache, and C. Lannou. Early stages of Septoriatritici blotch epidemics of winter wheat: build-up, over seasoning, and release of primary inoculums. Plant *Pathology* 60:166-177. 2011.

[21] Thomas MR, Cook RJ, King JE. Factors affecting development of *Septoriatritici* in winter wheat and its effect on yield. Plant Pathology 38(2): 246-257. 1989

[22] Zadocks, JC. On the conceptual basis of crop loss assessment: the threshold theory. Anmtc.LR eui.ewo JP hgtopattrc Log U 29' 455-473.1985.