Original Research Article

Evaluation of the effect of planting delay on cluster traits and yield and prevalence of wheat yellow rust in climatic conditions of northern Khuzestan province (Iran)

Abstract

This study was conducted to evaluate the effect of planting date on damage inflicted on the charactersAssociated with a cluster of wheat stripe rust pathogen of wheat affected by weather conditions in the northern Khuzestan province (Iran) crop year 2010-2011 asplit plot randomized complete block design with three replications. In this experiment, the planting date (ninth and tenth) as main plots and cultivars as sub plots were examined. The results showed that delayed planting trait because of early exposure toThe growth period of winter rainfall as one of the most important factors in the developmentThis condition leads to an increase of 25% plants were infected with this disease. All traits were reduced to non-grain weight and grain number per panicle hollow other traits (yield, grains per panicle and panicle length), this reduction was significant. Chamran cultivars in the first planting on average 3733.3 kg ha grain yield respectively. It is hoped with resistant cultivars in order to manage them properly, especially at the beginning of autumn rainfall is an effective step in controlling and reducing the damage to be removed.

Keywords: wheat, yellow rust, planting dates, varieties cluster.

Introduction

Yellow rust disease which is caused by fungus Puccinia striiformis Westend. f. sp. tritici Eriks. (PST) is an important wheat disease in Iran which exists in all regions especially in cold and humid areas and attacks wheat fields and causes a severe reduction in crop particularly when it becomes an epidemic. During 1993-1994, yellow rust epidemic caused a loss of 30% in wheat crop and destroyed about 1.5 million tons wheat (Torabi et al, 1995). Yellow rust disease is an important wheat disease that is prevalent in cold and temperate weather. Over the last decade, several epidemics of yellow rust have happened in many countries of the world especially in central parts and the west of Asia and the north of Africa. The first report is related to yellow rust disease in Iran in 1947 (Esfandiari, 1947). Cummins (1971) considered a comprehensive concept for p.strriiformis species and introduced species of 24 types from different poaceae as the host for this species. Hassebrauk (1965) studied the etymology of this type of fungus causing yellow rust and introduced a Eurasian origin for it and believed that it was first prevalent among uncultivated poaceae and then infected crop species after they emerged. According to Agrios (2004), temperate weather and a relatively high level of humidity can create grounds for development of wheat yellow rust, and emergence of new species reduces the general resistance among such species. In 1997, Grain and Plant Research, Improvement, and Provision Institute introduced Chamran cultivar which was resistant to yellow rust by 2003, which was attributed to the presence of seedling resistance gene Yr27 in it (Afshari et al, 2003). In evaluating the resistance of 100 advanced lines dry land wheat to yellow rust in Miyandoab, Pouralibaba et al (2002) reported that 62% of them were fragile at seedling stage while resistant at complete plant stage, 29% were resistant at both stage, 6% were fragile at both stages, and 3% were resistant at seedling stage while fragile at complete plant stage. According to the reports on the resistance of common wheat cultivars to yellow rust in the study carried out by Keshavarz and Torabi (1998), the first infection happened on March 28, 1996

in Dogonbadan region on Azadi cultivar and on May 2, 1996 in Boyer Ahmad area on the same cultivar in the form of 5S. It was also reported that Zagros cultivar was safe, Bayat semi-resistant, Maron, Sefid Sardari and Omid were semi-fragile, and Azadi was fragile. They reported the losses caused by the disease as 4.5% reduction in the crop. In 2002, yellow rust happened early in Washington State early due to appropriate weather conditions, and it was not controlled through chemical control, which resulted in a reduction of 20-25% in the crop. In 2003, the resistance of the wheat cultivars decreased in the U.S., and due to emergence of new species of this pathogen, a reduction of 25% in crop was reported (Chen, 2005).

The purpose of this project the negative effect of delayed planting of wheat infected farms fungal disease of wheat stripe rust in order to obtain accurate estimates of the damage caused by delayed planting in these lands.

Materials and Methods

The experiment 2010-2011 crops in Iran's Khuzestan province longitude 28″:48˚ Longitude 50″:31˚ to 33 m above sea level, and for loam soils with 2.7pH = a year in the agricultural field Shavvr as a split plot design (split-plot) in a randomized complete block design with three replications in a plot size of 10 × 5/8 meters away from the main plot of the repeat interval of 10 meters to 20 meters irrigation and drainage systems were implemented separately for each plot. Some meteorological parameters are given in Table 1. The main factor planting (planting one: ninth, planting delays: December 22) with 250 kg seed ha dose and Chamran cultivars were the sub plots.

In this experiment, the irrigated soil after reaching the optimal level (18-16% of dry weight basis) Cow ground, a common way of plowing to a depth of 30-25 cm using moldboard Plough ours treatments were conducted. 100 kg phosphorus and 50 kg N ha of urea ammonium phosphate source according to soil test results are given to land. All agricultural operations (excluding treatments) such as fertilizer application and spraying, etc., were the same in all plots. The land instead of vegetable crops (accumulation) and a month before planting to harvest the remaining residue was left fallow with the plow soil was mixed and buried. During the growing season, especially in the early stages of growth, weeds to be sprayed with insecticide thread Granstar rate of one liter per hectare and the amount was 25 grams per hectare. Possible to control the spread of yellow rust fungus was tried removing weeds Hashh millet field

as the host to control yellow rust. Also the use of pesticides, especially the tilt and Folicur swell clusters depending on the amount of pollution and disease (to prevent excessive growth and excessive) control.

Parameters such as yield and grain weight, grain, hollow grains per panicle and panicle length were measured. Finally, data obtained by analysis of variance with SAS and mean comparisons with Duncan test at 5% probability level was calculated.

Table 1 - Average temperatures and rainfall during the growing period

Agent	July	June	May	April	March	February	January	December
the average temperature	38	6.36	1.31	5.24	4.18	5.13	6.13	9.16
rainfall	0	0	2.9	3.4	713	8.85	4.13	4.8

Results and Discussion

Yield: According to the analysis of variance for grain yield in different planting dates and varieties ing significantly at 1% level and the interaction between the two factors was significant difference at 5% level (Table 2). has to be one of the main reasons for the performance decrease in temperature stress conditions delayed planting (Table 3). Total maximum yield Chamran on the ninth with an average of 3733.3 kg per hectare and minimum dose rate on December 22 with an average of 1633.3 kg ha (Table 4). The results of the survey Agrios (2004), based on increased disease affects increasing humidity and rainfall are quite consistent with the results of the Poor Ali Baba & colleagues (2002) that increases the damage of wheat yellow rust disease in infancy Rshdmtabq that there was a delay in sowing dates correspond. The results of the survey also Afshari & colleagues (2003) based on the resistance of wheat cultivar Chamran more consistent with my brother & Mansuri (2006) about the loss of resistance of resistant varieties such as Chamran was consistent over time. Torabi & colleagues (1995) also fell 30 %, & Chen (2005) also dropped 25 % crop varieties that are resistant to stripe rust resistance is gone after this date have reported the results in a direction.

TKW: Analysis of variance showed that among the various dates planting, varieties and interaction of two factors, there is no significant difference between the past Although this study did not show significant differences between the two varieties of seed

weight gain Coming to this conclusion, given that these traits are traits that are more influenced by genotype is quite natural numbers (Table 2). The delay in planting date according to Table 3 seed weight decreased Has the most important factors in the reduction of grain weight stress Environment such as the occurrence of early frost and a smaller plant growth and winter dormancy and cold-resistant and virulence factor increases to 25 percent for wheat stripe rust fungus can infect plants (Table 3).

Grain: Analysis of variance showed that among the various levels on planting varieties statistically significant at 1% level, but there is no significant difference between planting date and cultivar interaction between the two factors (Table 2) According to the comparison of the mean number of seeds I planted on average 12.16 Count Grain has the highest number of delayed planting on average 8.16 number was the lowest number of grains per panicle. Among the cultivars, with an average dose of 11.83 the average number of grains per panicle largest number of Chamran 8.50 the number of grains per panicle had the least number of grains per panicle (Table 3). Genotypic differences between cultivars and hybrids can be a major factor in the difference in the number of grains per panicle. The results of the survey Agrios (2004), based on increased disease affects increasing humidity and rainfall are quite consistent with the results of the Poor Ali Baba & colleagues (2002) that increases the damage of yellow rust of wheat in the early stages which matching there was a delay in sowing dates correspond.

The numbers of deaf grains per panicle, according to analysis of variance deaf grains per panicle number only between varieties were significant at the 1% level (Table 2). Observations from the results indicated that these adjectives mean comparisons between Different planting dates in a statistics class were no significant differences However, the cultivar Dose 3.43 allocated to the greater number of deaf grains per panicle and grain hollow Since this number represents the potential to increase the number of potential crop yield and total yield is thus dependent on the genotype of the past so we can stated that the number of potential seed production is not as good as its inputs, causing waste a significant portion of Agriculture and the energy of a can be due to lower the resistance to plant pathogen rust also but considering (Table 3). The results of the survey Afshari & colleagues (2003) on the resistance of wheat cultivar Chamran

Blatter, who led the study was to increase the efficiency of the food is consistent.

Clustered along the length of the cluster of traits associated genotypes is less affected External conditions placed on the analysis of variance also confirmed this statement does So that according to the results obtained

Table 2 - Summary of analysis of variance of some traits

S.O.V	df	yield	Grain weight	Grain	Deaf grains per panicle	Panicle length
Repeat	2	17658.33^{ns}	0.08^{ns}	3.58^{ns}	6.58*	0.01^{ns}
Date of planting	1	1449075.00**	12.00^{ns}	48.00**	1.33^{ns}	0.48*
Error (a)	2	20575.00	0.25	1.75	3.08	0.01^{ns}
cultivar	1	5922075.00**	16.33^{ns}	33.33**	33.33**	2.80**
Planting date ×cultivar	1	170408.33*	1.33^{ns}	0.33^{ns}	0.00^{ns}	0.01^{ns}
Error (b)	4	19116.66	2.33	0.83	0.66	0.04
CV(%)		5.39	6.89	8.97	7.20	3.29

Ns, * and **: Nonsignificant and significant at 5 and 1% level of probability, respectively.

Table 3 - Comparison of Average agronomic traits

Acting		yield (kg)	Grain weight (g)	Grain (Number /panicle)	deaf grains per panicle (Number /panicle)	Panicle length (Cm)
Date of planting	November 22	2911.67 a	23.16 a	12.16 a	11.00 a	6.15 a
	December 22	2216.67 b	21.16 b	8.16 b	11.66 a	5.75 b
Cultivars	Dose	1861.67 b	21.00 a	11.83 a	13.00 a	6.43 a
	Chamran	3266.67 a	23.33 a	8.50 b	9.66 b	5.46 b

Means in each column, followed by at least one similar letter(s) are not significantly different at 5% probability level using Duncan's Multiple Range Test.

Table 4 - comparison of some agronomic traits in experimental treatments

Acting		yield (kg)
November 22	Dose	2090.0 c
	Chamran	3733.3 a
December 22	Dose	1633.3 d
	Chamran	2800.0 b

Means in each column, followed by at least one similar letter(s) are not significantly different at 5% probability level using Duncan's Multiple Range Test.

from the data in Table 2 of this trait only Is significant at 1% probability level. According to the comparison table with the average cluster length is also reduced and delayed planting that could be effective in reducing the number of grains per panicle delayed planting Because this trait is influenced more by genotype data, so the end result of past stressors (condition and temperature) can be due to a decrease in plant growth period have delayed Among the cultivars, the dose averaged over the cluster, 6.43 cm with an average maximum spike length and Chamran 5.46 cm to the shortest clusters have been found, and as the results are compared with a maximum length of clusters dose Photo is dedicated to the Chamran highest number of grains per panicle and grain weight, it also has the lowest (Table 3).

Percent plant pollution: pollution of the plant is actually percentage of infected plants Disease (the extent to which the plants take (more than 20% of plants) and are observed) Shows the expression of sowing date (with appropriate management of infection in 2 digits Ratio was maintained) The spread of causal agent of the disease and thus the amount of damages to plant the show. Table 4 shows that the delay in planting because of the earlier plant Rainfall during the main causes of the spread of the fungus to grow with yellow rust Wheat is planted to a extent when compared to plants grown at a rate of 25%, which reflects the fact that more vegetative cycle of the plant, which contaminated losses resulting from the earlier stages of plant growth begins and the extent of the damage can be far more.

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