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Effect of Excessive Irrigation On The Breakdown of Root Rot diseases in Cotton crop from Sakrand Sindh

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Abstract: Field investigation was carried out to examine the effect of excessive irrigation on the Root rot disease and cotton yield at the Central Cotton Research Institute, Sakrand. In addition to this the plant showing mortality was recorded on the basis of applied treatments. It was noted that the Root rot disease was unaffected by the excessive irrigation. However, avoiding over-watering, destroying residues from previous crops prior to planting and the application of an effective Integrated Disease Management Strategy can produce one of several desirable outcomes to control Root rot.

Keywords: Excessive irrigation, Root Rot, Mortality, Diseases, Yield, Cotton.

1. INTRODUCTION

Cotton is the most important cash crop of Pakistan and one an average production it ranks 3rd after wheat and rice (Nazir, 2007). In addition to this it is a chief source of foreign exchange and provides lint for the textile industry (Wang *et al.,* 1996).

Due to lack of knowledge about many of cotton disease, these erupt out and cause severe damage to the cotton crop. (Panhwer *et al.,* 2001) reported that due to the excessive irrigation many of cotton diseases are formed in cotton. Similarly, (Summy and King 1992) stated that 16% of total crop production per anum in the world is lost due to plant diseases. In addition to this more recent (Yasir *et al*., 2012) carried work on the impact on Bt cotton from Vehari Pakistan.

Root rot is the serious disease of cotton occurring in Sindh, Pakistan. It is most destructive and widely distributed disease; it takes heavy tall of cotton plants in sick soil patches of cotton (Akhter, 1972). Root rot disease occurs due to the frequent irrigation and due to heavy rain fall period (Gaffar and Ervin, 1969). The use of insecticides for the control of pests has also created the problems of environmental pollution and disturbance of biological equilibrium. (Van Steenwyk *et al.,* 1975) reported that season long application of insecticides in cotton crop resulted destroying of beneficial insects and thus accelerating the emergence of secondary pest. The present study is an attempt to note the effect of excessive applications of water on the breakdown of root rot in the cotton crop. The objective of this topic is to find the positive or negative impacts of irrigation practice on factors constituting the components of the disease.

2. MATERIALS AND METHODS

Cotton variety CRIS-9 was sown in the 1st week of May during the year 2010-2012. All agricultural practices were done according to schedule. The experiment was laid out in a randomized complete block design with four replications. The 1600 cotton seeds were counted and planted in four rows per replication in a plot size of 47'X10'. Row to row and plant to plant distances were kept at 75 cm and 22 cm, respectively. The observations were recorded as percentages of germination, seedling rot, root rot, mortality, and boll rot diseases, and seed cotton yield. Keeping in view the identical symptoms both for root rot and mortality, plants were separately counted after every irrigation for separating them for mortality and root rot. The differences among various treatments were analyzed through standard method of variance (Steel and Torrie, 1980). The detail of treatments is as under:-

T_1 = First irrigation after 40-45 days of sowing and subsequent irrigation at 15 days interval.

T_2 = First irrigation after 40-45 days of sowing and subsequent irrigation when land was came into condition after previous irrigation.

T_3 = First irrigation after 40-45 days of sowing and subsequent irrigation when land was still in muddy condition due to previous irrigation.

T_4 = First irrigation after 40-45 days and subsequent irrigation at alternate days, and for this the plants were always in standing water up to the stoppage of last irrigation.

3. RESULTS AND DISCUSSIONS

The significant differences were found for the mortality, boll rot and seed cotton yield. During the three years (2010-2012) presence of mortality, observation of uprooted plants showed symptoms of root rot disease (i) Shredding (ii) Oozing of yellow sap pressing the roots. In addition few plants did not show the typical symptoms of root rot, infact these were found with killed root tips.

Root rot has been affected by soil moisture as the mortality due to disease was not significant during present study. Thus, it revealed that Root rot disease remained uninfluenced or it was neither increased nor decreased due to the excessive irrigation. The plants showing more mortality was recorded in the treatment (T_4) where

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subsequent irrigation applied at alternate days following treatments (T_1,T_2,andT_3) respectively. During the present study boll rot disease was also found slightly in all the treatments. Hopefully this work will be beneficial for the control of root diseases agencies.

During the present study statistically non-significant differences were observed for germination percentage, seedling rot disease percentage, as no treatment had suppressed or enhanced germination of seed and seedling rot disease percentage. The more mortality percentage was observed in T_4 (Subsequent irrigation at alternate days). Highest yield though non-significant was obtained from T_2 (subsequent irrigation when land came into condition) followed by the treatment T_1 (where subsequent irrigation was applied at 15 days interval.) Ghaffar *et al.,* (1969) found that Root rot is common disease in Shaheed Benazirabad (Old Nawabshah) district of Sindh, Pakistan. Daniel (1965) found that Root rot is the common in areas where higher water table influenced the Root rot disease in cotton. (Hussain and Ali 1975) worked on the infestation of cotton diseases at Sukrand, Shahdad Kot and Sakrand that varied from 10-60%.

Hence, irrigation practices have significant contribution to the root rot problems of the cotton, and irrigation practices can and should be modified to reduce the rate of increase of plant disease. Because plant diseases occur when a virulent pathogen interacts with a susceptible plant host under favorable environmental conditions. Therefore, it is essential that growers should do all they can to slow the rate of epidemic development by reducing the spread of pathogens, providing of the adequate nutrition to the host and by manipulating the crop environment so that it is less favorable for disease development.

Table. I. Showing the effect of irrigation on disease occurrence and yield of seed cotton during various year in Sindh

(a)

Treatments	**Year 2010**					
	Germination %	Seedling rot disease %	Mortality Root disease %	Mortality rot %	Boll Rot %	Yield Kg ha^{-1}
T1	66.1^{a}	2.5^{a}	2.8^{a}	0	8.1^{b}	1996^{a}
T2	63.3^{a}	2.9^{a}	2.7^{a}	0	8.4^{b}	1979^{ab}
T3	61.5^{a}	2.0^{a}	2.5^{a}	3.4a	10.9^{ab}	1840^{ab}
T4	65.9^{a}	2.7^{a}	2.6^{a}	5.6a	12.7^{a}	1418^{c}

(b)

Treatments	**Year 2011**					
	Germination %	Seedling rot disease %	Mortality Root disease %	Mortality rot %	Boll Rot %	Yield Kg ha^{-1}
T1	36.9^{a}	2.8^{a}	5.6^{a}	0	6.6^{b}	1797^{ab}
T2	37.6^{a}	2.4^{a}	4.5^{a}	0	6.0^{b}	1836^{a}
T3	38.2^{a}	2.7^{a}	5.5^{a}	3.5^{b}	9.8^{ab}	1463^{ab}
T4	38.0^{a}	3.2^{a}	4.9^{a}	5.8^{a}	11.3^{b}	921^{c}

(c)

Treatments	**Year 2012**					
	Germination %	Seedling rot disease %	Mortality Root disease %	Mortality rot%	Boll Rot %	Yield Kg ha^{-1}
T1	52.5^{a}	7.2^{a}	4.4^{a}	0	4.6^{b}	1634^{a}
T2	52.1^{a}	8.0^{a}	4.3^{a}	0	4.1^{b}	1631^{ab}
T3	53.9^{a}	7.8^{a}	4.3^{a}	3.4^{b}	6.7^{ab}	1430^{abc}
T4	52.4^{a}	7.4^{a}	3.5^{a}	6.3^{a}	8.5^{a}	1310^{c}

REFERENCES:

Akhter, C.M., (1972) Studies on the diseases of cotton in Punjab, The Pakistan Cottons, **(16)**: 48-52.

Daniels, J., (1965) Abyan root rot of cotton in Aden. Empire Cotton Grow. Rev, **(42)**: 104-122.

Ghaffar, A., G.A. Zentmyer and D.C. Ervin, (1969) Effect of amendments on severity of Macrophomia root rot of cotton. Phytopath., **(59)**: 1267-1269.

Ghulam, R.P., G.A. Panhwar, M.R. Magsi and A. Leghari, (2001) Effect of excessive irrigation on root rot and other cotton diseases. Pak. J. Biological Sci., 30-32.

Hussain, T. and M. Ali, (1975) A review of Cotton diseases of Pakistan. The Pak. Cottons, **(19)**: 71-86.

Summy, K.R. (1992) Cultural control of cotton insect pests in the United State. Crop Prot**. (11)**: 307-339.

Nazir A., (2007) Integration of Behavioral and biological control Tactics for the management of Pink and spotted bollworms cotton. Ph. D. Thesis Sindh University. 1-116.

Steel, R.G.D. and J.H. Torrie, (1980) Principles and procedures of statistics. A biometrical approach. Second Edition, McGraw-Hill Company, USA.

Van Steenwyk, A.R., N.C. Tonscano, G.R. Bollmer K. Kido and H.T. Reynolds., (1975) Increase of *Heliothis* spp. In: cotton under various insecticides treatments regimes. Environ. Entomol. **(4):** 993-996.

Wang,S.K, Zhang,B.B, Junjie,Y. and YongWei,L. 1996. The effect of sex pheromone in control of the 2nd generation bollworm. China Cotton, **(23)**: 17-18.

Yasir, Y.M., Z. Farooqi K..Bakhsh and M. Ahmed (2012) Impact of Bt. Cotton Varieties on Productivity: Evidence District Vehari, Pak. J. Agric. Soc. Sci., **(8):** 3, 109-111.