Effect of weather parameters on of pests and diseases in groundnut and castor in Salem district of Tamil Nadu, India

ABSTRACT

The roving survey on the incidence of pests and diseases in groundnut and castor was conducted from August, 2020 to March 2021 in Salem and Namakkal districts at fortnight intervals correlation with weather parameters revealed that, in groundnut three pests, leaffolder, *S. litura* and thrips and two diseases, leaf spot and root rot and in castor crop six insect pests, whiteflies, *A. janata*, *Euproctisspp*, *S. litura*, thrips and *C. punctiferalis*and two diseases, alternaria blight and botrytis rot were found feeding /infecting on different parts of the crop.The rainfall, relative humidity and wind speed had influenced significantly the incidence of leaffolder rainfall and relative humidity on root rot and maximum temperature on leafspot in groundnut. The whiteflies incidence in castor was positively correlated with temperature and rainfall where as lepidopteran pest, *S. litura* and blight by relative humidity and rainfall. The thrips and rot was influenced by relative humidity and rainfall, but blight not have any correlation with weather parameters . But natural enemies in groundnut and castor had non-significant correlation with weather parameters.

Keywords: Groundnut, Castor, Weather, Pests and diseases

1. Introduction

Weather parameters affect survival, reproduction and development of any insect lifecycle, propagation and outbreaks (Pedigo, 2004)and sudden changes in these abiotic factors adversely affect the population dynamics of insects (Prasad and Logiswaran, 1997 and Harish *et al.*, 2014).. It is important to study these relationships as it helps to plan appropriate management strategies in advance to minimize the crop losses.Groundnut and castor cropare attacked by more than 100 species of insect pests and diseases from sowing to till harvest and even in stored produce (Nandagopal*et al.*,, 2007 and Lakshminarayana, 2010). The present study was aimed to know the seasonal occurrence of insect pests and the relationship between the weather parameters and pest population in groundnut and castor in Salem district.

Comment [s1]: There are too few references, there are too many sources in this regard

2. MATERIALS AND METHODS

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The roving survey on the incidence of pests and diseases in groundnut and castor was conducted during 2020 and 2021 calendar years in Salem and Namakkal districts at fortnight intervals. The fixed plot for castor crop (YTP1) was sown at KVK, Sandhiyur during kharif, 2020 and ground (Dharani) at Kulathur on rabi, 2020 to monitor pests and diseases and the incidence of pests and diseases in castor and groundnut. The crop was made available for the pests throughout the year. The recommended package of practices was followed except crop protection in order to avoid influence of chemicals on insect population. The pheromone traps were installed in the experimental plot to monitor the defoliator pests. A modified sweep net method (Nandagopal *et al*., 2007) was followed to monitor sucking pest populations where, five sweeps were taken randomly using the sweep net from each experimental plot. The leafhoppers and thrips caught in the sweep net were then transferred into polythene bags, allowed to settle down and counted in laboratory. The weekly observations were recorded on number of moth catches per trap and number of adults of leafhoppers and thrips caught in the sweep net. Weather data pertaining to maximum and minimum temperature (^{0}C); morning and evening relative humidity (%); sunshine (h) and rainfall (mm) were collected daily from the automatic weather station of Panamarathupatti block. The data on insect populations and the weather parameters were statistically analyzed for correlation and regression using DSAASTAT software .

Comment [s2]: The effect of air parameters such as temperature and humidity can be easily checked in the laboratory. Why didn't you do it so that the results can be carefully discussed?

3. RESULTS AND DISCUSSION

3.1.Occurrence and intensity of pests in groundnut and castor

Occurrence of pests and diseases on groundnut revealed that three pests, leaffolder, *S. litura* andthrips and two diseases, leaf spot and root rot and in castor crop revealed that six insect pests, Whiteflies, *A. janata, Euproctisspp, S. litura,* thrips and *C. punctiferalis*and two diseases, alternaria blight and botrytis rot found feeding /infecting on different parts of the crop (Table 1).The correlation co- efficient revealed that rainfall, relative humidity and wind speed had influenced significantly the incidence of leaffolder (0.47998, 0.311421 and 0.339961), rainfall and relative humidity on root rot (0.433059 and 0.393255) and maximum temperature (0.67911) on leafspot in groundnut. The whiteflies incidence in cotton was positively correlated with temperature (0.490967) and rainfall(0.389125) where as lepidopteran pest, *S. litura* by relative humidity (0.61212) and rainfall (0.49415). The results were in accordance with the findings of Jayanthi *et al.,* (1993) , Ratnapara*et al.,* (1994) and Ruba and Padmapriya, 2020.The

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thrips and rot was influenced by relative humidity (0.570641 and 0.469101), but blight was not have any correlation with weather parameters (Table 2).

3.2. Correlation between incidence of different insect pests in groundnut and castor and weather parameters

In fixed plot, occurrence of pests and diseases on groundnut during rabi season revealed that three pests, leaffolder , *S. litura* and thrips and two diseases, leaf spot and root rot and in castor crop revealed that six insect pests, whiteflies, *A, janata, Euproctisspp, S. litura,* thrips and *C. punctiferalis*and two diseases alternaria blight and botrytis rot found feeding /infecting on different parts of the crop (Table 3).The incidence of thrips and root rot (22/20pls and 28-35%) were found to be maximum during the month of December and leaf spot from second fort night of January to March (30-45%). In castor, the whiteflies incidence was high during vegetative stage (August-September) and found to decline due to intermittent rainfall and again flareup during the month of February and March (12-35 /20 pls) but the incidence of thrips was found be high during October to December (12-30/20 pls.). The blight in castor was recorded from August to January (2-20%) and rot from the month of November (2-13%). In fixed plot survey in castor, correlation co- efficient revealed that incidence of leaffolder was not influenced by weather but *S. litura* and leafspot by temperature (0.48476 and 0.88308), relative humidity, wind speed and rainfall had positive correlation on thrips and root rot (0.65914 and 0.77965, 0.57456 and 0.82709) in groundnut. The whiteflies incidence in cotton was positively correlated with temperature (0.67516) where as thrips,rot and*S. litura*by relative humidity (0.65793, 0.52732 and 0.24170) and rainfall on thrips and *S. litura* (0.37354 and 0.31510)(Selvaraj *et al.*, 2010 and Lakshmi and Reddy, 2015) but blight not have any correlation with weather parameters (Table 4).

CONCLUSION

In groundnut rainfall, relative humidity and wind speed had influenced significantly the incidence of leaffolder rainfall and relative humidity on root rot and maximum temperature on leafspot in groundnut. The whiteflies incidence in castor was positively correlated with temperature and rainfall where as lepidopteran pest, *S. litura* and blight by relative humidity and rainfall. The thrips and rot was influenced by relative humidity and rainfall, but blight not have any correlation with weather parameters .

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Table 1. Occurrence and intensity of pests in groundnut and castor during kharif and rabi season, 2020-21 in Salem district (Roving Survey)

Pests	Number per 20 plants/Per cent damage or infected																
	1 FN Aug	2 FN Aug	1 FN Sep	2 FN Sep	1 FN Oct	2 FN Oct	1 FN Nov	2 FN Nov	1 FN Dec	2 FN Dec	1 FN Jan	2 FN Jan	1 FN Feb	2 FN Feb	1 FN Mar	2 FN Mar	Mean
Groundnut																	
Leaffolder (%)	23	26	26	43	47	17	16	20	18	14	12	15	12	15	12	10	20.38
Spodoptreralitura	5	7	0	0	0	0	0	0	4	0	0	0	5	0	5	0	1.63
Thrips	15	12	5	0	0	5	7	7	25	18	22	12	7	5	16	15	10.69
Leaf spot (%)	12	10	12	10	7	8	5	5	7	15	18	12	21	33	45	24	15.25
Root rot (%)	0	0	10	10	14	26	12	7	15	0	0	0	0	7	0	0	6.31
Castor																	
Whiteflies	30	25	56	30	25	12	34	25	8	5	0	0	43	20	31	25	23.06
Achaea janata	12	10	12	10	7	8	5	5	7	12	9	10	9	8	5	5	8.38
Euproctisspp	0	0	0	0	0	0	0	0	15	0	0	0	12	7	0	0	2.13
Spodoptreralitura	5	7	15	22	9	7	15	12	12	11	8	16	5	7	5	7	10.19
Thrips	15	12	20	0	0	5	7	7	25	18	22	12	7	5	16	15	11.63
Conogethespunctiferalis	0	0	0	0	0	0	10	13	17	10	8	14	12	4	16	12	7.25
Spiders	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0.38
Alternaria Blight (%)	17	25	45	54	33	26	12	14	15	12	15	13	0	0	0	0	17.56
Botrytis rot (%)	0	0	0	0	0	0	2	5	13	10	10	5	12	2	5	3	4.19

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Table 2.Correlation co-efficient between incidence of different insect pests in groundnut and castor and weather parameters during kharif and rabi season, 2020-21 in Salem district (Roving Survey)

Pests	Mean Popl./Damage	Weather Parameter correlation Coefficient					
		Max Temp	Min Temp	RH (%) I	RH (%) II	Wind speed	Rainfall (mm)
Groundnut							
Leaffolder	20.38	-0.10626	0.105219	0.139932	0.311421	0.339961	0.47998
Spodoptreralitura	1.63	0.15517	0.08053	-0.23931	-0.20211	0.16803	-0.24351
Thrips	10.69	-0.23185	-0.28448	0.239618	0.126437	0.090445	-0.43695
Leaf spot	15.25	0.67911	0.261815	-0.6327	-0.79703	-0.42997	-0.56861
Root rot	6.31	-0.17788	-0.15567	0.052243	0.393255	-0.13354	0.433059
Castor							
Whiteflies	10.31	0.490967	0.280759	-0.27483	-0.20635	0.112066	0.389125
Achaea janata	2.36	-0.38484	-0.34896	0.184264	0.165217	0.562241	0.015138
Euproctisspp	2.5	0.116513	-0.26484	-0.21018	-0.14755	-0.4291	-0.32174
Spodoptreralitura	1.56	-0.37052	-0.18248	0.61212	0.42835	0.15260	0.49415
Thrips	6.88	-0.33743	-0.28528	0.570641	0.168014	0.18139	-0.34248
Conogethespunctiferalis	5.81	0.115307	-0.10983	0.122799	-0.15143	-0.45745	-0.40291
Alternaria Blight	9.00	-0.16147	-0.48214	0.149615	0.031256	-0.36902	-0.48539
Botrytis rot	4.19	-0.39302	-0.10038	0.327876	0.469101	0.059823	0.040183

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Table 3. Occurrence and intensity of pests in groundnut and castor during kharif and rabi season, 2020-21 in Salem district (Fixed Plot Survey)

Pests	Number per 20 plants/Per cent damage or infected																
	1 FN Aug	2 FN Aug	1 FN Sep	2 FN Sep	1 FN Oct	2 FN Oct	1 FN Nov	2 FN Nov	1 FN Dec	2 FN Dec	1 FN Jan	2 FN Jan	1 FN Feb	2 FN Feb	1 FN Mar	2 FN Mar	Mean
Groundnut																	
Leaffolder (%)	-	-	-	-	-	-	-	-	12	11	12	12	16	9	5	14	11.38
Spodoptreralitura	-	-	-	-	-	-	-	-	0	0	0	0	5	0	5	0	1.25
Thrips	-	-	-	-	-	-	-	-	22	12	11	15	6	6	17	3	11.50
Leaf spot (%)	-	-	-	-	-	-	-	-	17	12	19	30	45	40	43	37	30.38
Root rot (%)	-	-	-	-	-	-	-	-	28	35	0	0	0	0	0	0	7.88
Castor																	
Whiteflies	25	12	20	0	0	0	0	0	0	0	0	0	12	28	35	33	10.31
Achaea janata	0	10	2	5	2	0	0	0	0	0	12	7	0	0	0	0	2.36
Euproctisspp	0	0	0	0	30	10	0	0	0	0	0	0	0	0	0	0	2.50
Spodoptreralitura	0	0	0	0	18	0	7	0	0	0	0	0	0	0	0	0	1.56
Thrips	0	0	0	0	0	12	30	24	26	18	0	0	0	0	0	0	6.88
Conogethespunctiferalis	0	0	0	0	0	0	0	0	17	10	8	14	12	4	16	12	5.81
Grasshopper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Alternaria Blight (%)	2	2	15	12	20	12	12	14	15	12	15	13	0	0	0	0	9.00
Botrytis rot (%)	0	0	0	0	0	0	2	5	13	10	10	5	12	2	5	3	4.19

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Table 4.Correlation co-efficient between incidence of different insect pests in groundnut and castor and weather parameters during kharif and rabi season, 2020-21 in Salem district (Fixed Plot Survey)

Pests	Mean Popul./Damage	Weather Parameter correlation Coefficient					
		Max Temp	Min Temp	RH (%) I	RH (%) II	Wind speed	Rainfall (mm)
Groundnut							
Leaffolder	11.38	-0.10878	0.03029	0.01907	0.09660	0.03748	0.07537
Spodoptreralitura	1.25	0.48476	0.19355	-0.51234	-0.52606	-0.53311	-0.42885
Thrips	11.50	-0.52612	-0.55616	0.65914	0.59250	0.30029	0.57456
Leaf spot	30.38	0.88308	0.57635	-0.88970	-0.97087	-0.83541	-0.89216
Root rot	7.88	-0.54669	-0.31446	0.56796	0.77965	0.69851	0.82709
Castor							
Whiteflies	10.31	0.67516	0.61609	-0.65242	-0.71370	-0.01589	-0.29506
Achaea janata	2.36	-0.34983	-0.33994	0.25650	0.10122	0.08512	-0.20192
Euproctisspp	2.50	0.09341	0.06881	-0.15623	0.13744	-0.11365	0.11689
Spodoptreralitura	1.56	0.04158	0.11861	0.06515	0.24170	-0.11661	0.31510
Thrips	6.88	-0.47196	-0.26024	0.56400	0.65793	-0.01649	0.37354
Conogethespunctiferalis	5.81	0.29982	-0.11691	-0.15218	-0.38920	-0.45141	-0.68997
Alternaria Blight	9.00	0.04294	-0.23752	0.19991	0.10568	-0.29538	-0.42145
Botrytis rot	4.19	-0.43354	-0.54435	0.52732	0.30684	-0.17899	-0.19100

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Comment [s3]: Add a new reference

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