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Survey to know the population of white grub in ground nut crop of Jaipur district, Rajasthan

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Abstract

White grubs are the majorly prevalent and noxious pest of ground nut crop in Rajasthan and also considered as national pest of India. White grubs are polyphagous in feeding pattern and emergence and damage activities rely on climatic factors and cropping patterns. The experiment on “Survey to know the population of white grub in groundnut crop of Jaipur district, Rajasthan” was executed during *Kharif* 2021 and 2022. The survey study lighted that the maximum infestation and population of white grub was found in village Hastera of Chomu tehsil of Jaipur district with 1.36 ± 0.61 grubs per quadrat (One square feet) followed by Dodhsar, Bilandarpur and Nawalpura. The maximum damage activities of white grubs in groundnut were noticed in between 30 to 60 days after initial rainfall.

Keywords: Survey, damage potential, white grub and groundnut

Introduction

Oilseed crops have been the mainstay in various agricultural economies from ancient times or play a prime role in agricultural industries and trade throughout the world. Groundnut (*Arachis hypogea* L.) is also admitted as ‘king of oilseeds’ and an annual herbaceous legume comes from fabaceae family and procreated from South America. It is 4th most valuable source of edible oil and 3rd most prime source of vegetable protein in the world (Deepthi, 2014) [4]. India is second largest producer of groundnut in world with total area covered about 6.09 million hectare, production of 10.21 million tonnes with a productivity of 1676 kg per hectare (Anonymous, 2021) [1]. The groundnut chiefly grown in Gujarat, Rajasthan, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra states of the country; *H. consanguinea* pest infestations also noted at various locations in those states. In Rajasthan, area of groundnut crop is 0.86 million hectare, production of 1.93 million tonnes and productivity of 2256 kg per hectare (Anonymous, 2021) [1]. There are abiotic and biotic constraints hamper the production of groundnut. The abiotic and biotic factors are unreliable rainfall pattern, variable weather pattern, attack of Insect pests, seed and soil borne diseases which results in poor germination or early mortality of seedlings. Amid in biotic constraints various insect pest like red hairy caterpillar, white grub, aphids, thrips and mites damage the ground crop in which “white grub” especially species belong to three subfamilies; Melolonthinae, Rutelinae and Dynastinae is majorly deficit the groundnut crop in northern-western region of Rajasthan due to congenial soil and climatic conditions. The economics of damage in endemic areas and the damage to groundnut crop ranges from 20-80%. The chemical control may be initiated if the pest population crosses threshold level of one grub per square meter (Nataraja MV, 2015) [5]. Predicting the abundance of the target pest is essential for the accurate scheduling of management programme. Such predictions require an understanding of the relationship between insect life cycle and development rate related to weather, computer models can also be used to predict as to when the target pest will be most abundant during the growing season and consequently when crops are at most risk. Hence, at first studies were conducted to find out the pest population at Jaipur district of Rajasthan falling under Semi-Arid Region.

Material and Methods

An investigation was carried out to study the extent of damage of white grub after initial rainfall of season. For the cause, a roving survey was carried out in Jaipur districts of Rajasthan during *kharif* 2021 & 2022. Two village from tehsils of district (Table1) were selected to observe the damaging potential of white grub. As a representative of each village, three fields were identified and selected for the experimental survey. The information on above locations is given as under.

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Table 1: Details of different locations for survey

S.No.	District	Tehsil	Village	Latitude	Longitude
1.	Jaipur	1. Chomu	1. Hastera	27.2424°N	76.5340°E
			2. Dodhsar	27.2859°N	75.6260°E
		2. Shahpura	3. Bilandarpur	27.3493°N	75.7490°E
			4. Nawalpura	27.2893°N	75.9368°E

Observation: The extent of damage was examined from 15 day after germination of upto 90 days, by dividing each field into three quadrates of one square feet area. The number of grubs were recorded from each quadrate by digging up of soil upto 25 cm deep by shovel and further mean data analyzed.

Result and Discussion

The monitoring of white grub population through field survey was conducted during *Kharif*, 2021 and 2022 in groundnut growing areas of district Jaipur. The potency of white grub with their mean population per quadrate were noted as 1.06 ± 0.15 and 1.16 ± 0.24 year 2021 and 2022 respectively of Jaipur district. The data of Hastera village conferred in (Table 2), exhibit that the population of white grub differs from 0.45 ± 0.19 to 2.22 ± 0.39 grubs per quadrate, while the mean population of white grub was 1.26 ± 0.67 grubs per quadrate in the year 2021. The maximal population of white grub was noticed as 2.22 ± 0.39 at 45 Days after germination, whereas the minimal was 0.45 ± 0.19 noted on 90 Days after germination. During the year 2022, the population varied from 0.89 ± 0.19 to 2.33 ± 0.00 grubs per quadrate with the mean population was 1.46 ± 0.56 grubs per quadrate. The maximal and minimal grub population per quadrate was seen as 2.33 ± 0.00 and 0.89 ± 0.19 at 30, 90 days after germination respectively.

The data of Dodhsar village revealed that the population of white grub varies from 0.56 ± 0.19 to 1.89 ± 0.19 grubs per quadrate, while the mean population of white grub was 1.06 ± 0.49 grubs per quadrate in the year 2021. The peak of population of white grub was 1.89 ± 0.19 accounted at 30 Days after germination, whereas the nethermost was 0.56 ± 0.19 noted on 90 Days after germination. During the year 2022, the population varied from 0.44 ± 0.19 to 2.00 ± 0.00 grubs per quadrate with mean population noted was 1.20 ± 0.53 grubs per quadrate. The maximal and minimal grub population per quadrate was noted as 2.00 ± 0.00 and 0.44 ± 0.19 at 30, 90 days after germination respectively (Table 2). The mean data of white grub were 1.16 ± 0.14 and 1.33 ± 0.18 grubs per quadrate in chomu tehsil during the continual years 2021 and 2022, serially. In nawalpura village The data indicated that the population of white grub ranged from 0.22 ± 0.19 to 1.78 ± 0.19

grubs per quadrate, while the average population of white grub was 0.91 ± 0.65 grubs per quadrate in the year 2021. The maximal population of white grub was 1.78 ± 0.19 accounted at 30 Days after germination, whereas the minimal was 0.22 ± 0.19 noted on 90 Days after germination. During the year 2022, the population differed from 0.33 ± 0.19 to 1.67 ± 0.34 grubs per quadrate with mean population noted was 0.96 ± 0.57 grubs per quadrate. The maximal and minimal grub population per quadrate was noted as 1.67 ± 0.34 and 0.33 ± 0.19 at 45, 90 days after germination, serially. The data of Bilandarpur village showed that the population of white grub varies from 0.44 ± 0.19 to 1.67 ± 0.58 grubs per quadrate, while the mean population of white grub was 0.98 ± 0.54 grubs per quadrate in the year 2021. The peak of population of white grub was 1.67 ± 0.58 accounted at 30 Days after germination, whereas the least was 0.44 ± 0.19 noted on 90 Days after germination. During the year 2022, the population varied from 0.33 ± 0.00 to 2.00 ± 0.33 grubs per quadrate with mean population noted was 1.02 ± 0.74 grubs per quadrate. The maximal and minimal grub population per quadrate noted as 2.00 ± 0.33 and 0.33 ± 0.00 at 30, 90 days after germination, respectively (Table 2). The mean data of Shahpura tehsil were 0.95 ± 0.05 and 0.99 ± 0.04 grubs per quadrate during the consecutive years 2021 and 2022 respectively.

The pooled data procured were grubs per quadrate was divulged as 1.11 ± 0.19 in Jaipur. Tehsils of Jaipur showed average grubs per quadrate were as 1.24 ± 0.16 , 0.97 ± 0.04 , in Chomu, Shahpura, serially. The result exhibited that the damaging activity of white grub was found maximum between 30 to 45 days and minimum at 75 to 90 days after the first shower of monsoon Such sorts of findings were also confirmed by Yadava and Sharam noted that one grub/m² may generate 80-100 per cent plant mortality. Bhagat and Kashyap (1997) [2] reported the presence of 1-2 grub per meter cubic area could cause 80-100 per cent plant mortality. Moreover, John Rogers *et al.*, (2005) [6] observed reduction in yield due to *Holotrichia* species by about 4 g to 7.2 g per larva. Chudasama (2019) [3] found that the maximum mean population was 1.10 ± 0.25 grubs per quadrate at Vishavadar tehsil, while lower was reported in Junagadh tehsil 0.68 ± 0.11 per quadrate.

Table 2: Population of white grub in groundnut growing fields of Jaipur District during *kharif*, 2021 and 2022

Tehsil	Village	Days after germination (DAG)	Number of grubs per quadrate		
			2021	2022	Pooled
Chomu	1. Hastera	15	0.89±0.19	1.00±0.00	0.94±0.09
		30	1.89±0.19	2.33±0.00	2.11±0.09
		45	2.22±0.39	1.89±0.19	2.05±0.29
		60	1.22±0.19	1.44±0.19	1.33±0.19
		75	0.89±0.19	1.22±0.19	1.05±0.19
		90	0.45±0.19	0.89±0.19	0.67±0.19
		Mean population during season	1.26±0.67	1.46±0.56	1.36±0.61
	2. Dodhsar	15	0.78±0.19	1.00±0.00	0.89±0.09
		30	1.89±0.19	2.00±0.00	1.94±0.09
		45	1.33±0.00	1.56±0.19	1.44±0.09
		60	1.00±0.00	1.22±0.19	1.11±0.09
		75	0.78±0.19	1.00±0.33	0.89±0.26
		90	0.56±0.19	0.44±0.19	0.50±0.19
		Mean population during season	1.06±0.49	1.20±0.53	1.13±0.51
Mean population of Chomu tehsil			1.16±0.14	1.33±0.18	1.24±0.16
Shahpura	3. Nawalpura	15	0.33±0.00	0.44±0.00	0.38±0.00
		30	1.78±0.19	1.56±0.51	1.67±0.35
		45	1.56±0.20	1.67±0.34	1.61±0.27
		60	1.00±0.33	1.11±0.19	1.05±0.26
		75	0.56±0.19	0.67±0.00	0.61±0.09
		90	0.22±0.19	0.33±0.19	0.27±0.19
		Mean population during season	0.91±0.65	0.96±0.57	0.93±0.61
	4. Bilandarpur	15	0.67±0.00	0.44±0.00	0.55±0.00
		30	1.67±0.58	2.00±0.33	1.83±0.45
		45	1.66±0.00	1.89±0.19	1.77±0.09
		60	0.78±0.19	0.89±0.19	0.83±0.19
		75	0.67±0.00	0.56±0.20	0.61±0.10
		90	0.44±0.19	0.33±0.00	0.38±0.09
		Mean population during season	0.98±0.54	1.02±0.74	1.00±0.64
Mean population of Shahpura tehsil			0.95±0.05	0.99±0.04	0.97±0.04
Mean population of Jaipur district			1.06±0.15	1.16±0.24	1.11±0.19

Conclusion

Through this survey, the study aims to gain a better understanding of the population of white grub and its impact on groundnut cultivation. The result articulated that the extent of damage was found maximum between 30 to 45 days and minimum at 75 to 90 days

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