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Effect of different levels of NADEP manure on insect-pests and disease in different crops grown under certified organic farm

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Abstract
Effect of different levels of NADEP manure on insect-pest infestation as well as disease intensity in five different crops were studied at Certified Organic Farm of Navsari Agricultural University, Navsari. The result of an experiment indicated that nitrogen plays an important role on insect infestation as well as disease intensity in different crops. Higher infestation of sorghum stem borer, cabbage head borer, onion thrips and tomato fruit borer were found in when applied higher dose of NADEP manure (100% RDN). Whereas in case of disease intensity, higher disease intensity including sorghum anthracnose, alternaria leaf spot of cabbage, purple blotch of onion and early blight of tomato were also found in treatment receiving 100% RDN through NADEP manure. While in green gram, higher infestation of aphid as well as higher intensity of powdery mildew were found in treatment of 4 tonne NADEP manure per hectare.

Keywords: NADEP, organic farm, Navsari

Introduction
The prime requirement to make organic farming success is to identify sustainable and profitable crops and its varieties under organic farming. Many criteria *viz.*, crop productivity, pests and disease resistance, crop profitability, residue generation, produce quality improvement and soil health improvement, *etc* are used to test feasibility of crops under organic farming. Among them, crops resistance to pests and diseases is the most important criteria because pest management with organic practices is one of the great challenges in organic farming. In chemical driven farming, millions of rupees are expending on the pesticide every year to control the pests and diseases of different crops worldwide. Many studies indicated that application of heavy fertilizer dose leads to physiological susceptibility of crops to pest and diseases (Magdoff, 1992) [4]. Keeping in vision the current situation, there is need to develop pest and disease control programmed in organic farming to keep the pests and diseases under economic threshold level. The present study deals to compare the insect, pests and disease intensity in different crops grown under different levels NADEP manures.

Materials and methods
The experiment using FRBD with three replications was conducted at Certified Organic Farm of Navsari Agricultural University, Navsari, Gujarat during *rabi* 2017-18 and 2018-19. In which, five different crops (*i.e.*, sorghum, green gram, cabbage, onion, tomato) were tested under three levels of NADEP manures (M1: 100% RDN, M2: 50% RDN, M3: 4t/ha). The NADEP manure was applied on N equivalent basis. The RDN for sorghum, green gram, cabbage, onion and tomato was 80, 20, 200, 75 and 75 kg/ha, respectively. Sorghum (GJ 38), green gram (CO- 4), cabbage (Golden acre), onion (pilipati) and tomato (GT-2) were grown with recommended package of practices.

Data of insect-pest infestation were recorded by using following methods
For infestation of sorghum stem borer, the number of dead heart caused by stem borer (*C. partellus*) and total number of plants were counted from each treatment for calculation of per cent dead hearts. Likewise in case of cabbage and tomato, recorded the damaged head by cabbage head borer (*H. undalis*) and damaged tomato fruits by fruit borer (*H. armigera*) from total number of healthy cabbage head and tomato fruit, respectively and it was recorded at the time of harvesting for calculation of per cent damaged data. Whereas, The population of green

gram aphid and onion thrips were recorded from five randomly selected and tagged plants in each plot at 15 days interval from the first appearance of the pest till to harvesting of the crop. Aphid population counted as per aphid index (0-4 grades) which was given by Kogan and Pitre (1980) [3]. While in thrips, average population counted from five onion plants in each plot.

For sorghum stem borer, cabbage head borer and tomato fruit borer, the per cent damage was counted by using the following formula.

$$\text{Per cent dead hearts (\%)} = \frac{No.\,of\ plants\ showing\ dead\ heart}{Total\ no.\,of\ plants\ (70)} \times 100$$

$$\text{Per cent head damage (\%)} = \frac{No.\,of\ head\ damaged}{Total\ no.\,of\ head\ (40)} \times 100$$

$$\text{Per cent fruit damaged (\%)} = \frac{No.\,of\ fruit\ damaged}{Total\ no.\,of\ fruits\ (50)} \times 100$$

Data of disease intensity were recorded by using following methods

Disease intensity of sorghum anthracnose (*Colletotrichum* spp.), powdery mildew of green gram (*Erysiphe polygoni*), alternaria leaf spot of cabbage (*Alternaria brassicicola*), purple blotch of onion (*Alternaria porri*) and early blight of tomato (*Alternaria solani*) were recorded as the proportion of leaf area infected from 5 randomly selected plants in each treatment. Further, the disease intensity was recorded at 45 DAS and 90 DAS by using standard disease rating scales which was differ as per disease and crop. In which, 1-5 disease rating scale for sorghum anthracnose (Thakur *et al.*, 2007), 0-9 standard scale for powdery mildew of green gram (Mayee and Datar, 1986) [5], 0-5 disease rating scale for alternaria leaf spot of cabbage (Borkar and Patil, 1995) [1], 0-5 standard scale for purple blotch of onion (Sharma, 1986) [7] and 0-5 disease rating scale for early blight of tomato (Horsfall and Barette, 1945) [2] were used for calculation of PDI. Per cent Damage Intensity was calculated by using following formula proposed by Wheeler (1969) [8].

$$\text{Per cent Disease Intensity (PDI)} = \frac{Sum\ of\ the\ individual\ disease\ ratings}{Total\ number\ of\ leaves \times Maximum\ scale\ observed} \times 100$$

Result and discussion

Effect of different levels of NADEP manure on insect-pest infestation

Dead hearts by stem borer recorded during *rabi* 2017-18 and 2018-19 were summarized in table 1. In which, mean stem borer infestation in terms of per cent dead heart was ranged from 8.1 to 10.0%. And among the different treatment, lowest per cent dead heart damage was recorded in M3 (4 t/ha) and highest per cent dead heart was recorded in treatment M1 (100% RDN) during both the individual years. While, data presented in table 2 showed the incidence of aphid on green gram. Higher aphid population (2.2 aphid index/ plant) were observed in M3 treatment (4 tonne NADEP/ha) because of higher rate of manure addition as compared to other treatments. In case of cabbage head borer, result revealed that the maximum per cent head damaged due to *Hellula undalis* was noticed under treatment M1 (21.7%) and minimum per cent head damaged was noticed under treatment M3 (17.5%) during both individual years as well as the mean of two years (Table 3). Results presented in table 4 revealed that the highest incidence of onion thrips was recorded under treatment M1 (100% RDN). However, comparatively lowest thrips was observed under the treatment M3 (4 tonne NADEP/ha) during both the individual years as well as the mean of two years. Whereas in tomato, the highest mean per cent fruit damaged (21.0%) due to *H. armigera* was noticed under treatment M1 (100% RDN) and lowest mean per cent fruit damaged (18.3%) was observed under M2 (50% RDN) (Table 5).

Table 1: Percent dead heart due to stem borer (*C. partellus*) in sorghum

Treatment	Dead hearts (%)		
	2017-18	2018-19	Mean of two year
M1: 100% RDN	10.5	9.5	10.0
M2: 50% RDN	9.5	8.1	8.8
M3: 4t/ha	9.0	7.1	8.1

Note: Mean of three replication

Table 2: Mean population of aphid in green gram

Date of observation	Mean aphid index/ plant 2017-18			Date of observation	Mean aphid index/ plant 2018-19			Mean of two year		
	M1	M2	M3		M1	M2	M3	M1	M2	M3
05/12/17	0.6	0.6	0.5	30/11/18	0.8	0.6	0.9	0.7	0.6	0.7
20/12/17	1.1	0.8	1.1	15/12/18	0.9	1.2	1.4	1.0	1.0	1.3
05/01/18	1.6	1.2	1.7	31/12/18	1.5	1.5	1.8	1.6	1.4	1.8
20/01/18	1.9	1.9	2.2	16/01/19	1.9	2.0	2.5	1.9	1.9	2.1
05/02/18	2.4	2.5	2.9	01/02/19	2.9	2.3	2.9	2.7	2.4	2.9
20/02/18	3.1	3.1	3.4	15/02/19	3.1	2.8	3.2	3.1	3.0	3.3
05/03/18	2.5	2.7	3.1	01/03/19	2.9	3.1	3.1	2.7	2.9	3.1
20/03/18	2.7	1.5	2.3	16/03/19	2.5	2.1	2.5	2.6	1.8	2.4
Mean	2.0	1.8	2.2		2.1	1.9	2.3	2.0	1.9	2.2

Note: Mean of three replication

Table 3: Percent head damaged due to head borer (*H. undalis*) in cabbage

Treatment	Head damaged (%)		
	2017-18	2018-19	Mean of two year
M1: 100% RDN	20.0	23.3	21.7
M2: 50% RDN	18.3	19.2	18.8
M3: 4t/ha	16.7	18.3	17.5

Note: Mean of three replication

Table 4: Mean population of thrips (*thrips tabaci*) in onion

Date of	Mean of thrips/plant			Date of	Mean of thrips/plant			Mean of two year		
	M1	M2	M3		M1	M2	M3	M1	M2	M3
12/12/17	0.9	1.5	1.3	10/12/18	1.1	1.3	1.0	1.0	1.4	1.2
27/12/17	2.7	2.7	2.9	26/12/18	2.1	3.3	3.5	2.4	3.0	3.2
13/01/18	6.8	6.3	6.9	09/01/19	7.5	7.2	8.3	7.2	6.8	7.6
28/01/18	12.1	11.3	9.8	24/01/19	13.5	11.9	10.4	12.8	11.6	10.1
12/02/18	24.5	19.4	18.6	08/02/19	23.7	20.1	19.0	24.1	19.8	18.8
30/02/18	13.3	10.9	10.7	25/02/19	14.4	12.5	11.0	13.8	11.7	10.9
15/03/18	8.5	8.9	6.8	10/03/19	8.4	9.2	7.0	8.4	9.0	6.9
Mean	9.8	8.7	8.2		10.1	9.4	8.6	10.0	9.0	8.4

Note: Mean of three replication

Table 5: Percent fruit damaged due to fruit borer (*H. armigera*) in tomato

Treatment	Fruits damaged (%)		
	2017-18	2018-19	Mean of two year
M1: 100% RDN	21.3	20.7	21.0
M2: 50% RDN	18.7	18.0	18.3
M3: 4t/ha	20.0	18.7	19.3

Note: Mean of three replication

Effect of different levels of NADEP manure on disease intensity

In anthracnose of sorghum, the highest mean per cent disease index was observed in treatment M1 (11.0%). While, the lowest mean PDI was observed in treatment M2 (8.9%). Here, higher PDI was recorded in 2017-18 as compering to 2018-19 (Table 6). The data on PDI of powdery mildew of green gram was revealed that highest per cent disease index was observed in treatment M3 (34.7%) and minimum per cent disease index was observed in treatment M2 (29.0%) in both individual years as well as the mean of two year (Table 7) because of nutrient stress as M2 treatment received less N through manure as compared to M3 and M1. In case of alternaria leaf spot of cabbage, the highest PDI was observed in treatment M1 (10.6%) and the lowest PDI was observed in treatment M3 (8.6%) during both the individual years as well as the mean of two years (Table 8). The data on PDI of purple blotch of onion was revealed that the highest PDI was observed in treatment M1 (12.7%) and the lowest PDI was noticed in treatment M2 (10.9%) (Table 9). While in tomato early blight, the highest mean PDI was observed in treatment M1 (26.7%) as compared to M2 (22.8%) and M3 (24.1%) (Table 10).

Table 6: Percent disease index of anthracnose in sorghum

Treatment	Per cent disease index (PDI)		
	2017-18	2018-19	Mean of two year
M1: 100% RDN	11.7	10.3	11.0
M2: 50% RDN	9.9	7.9	8.9
M3: 4t/ha	9.7	9.8	9.8

Note: Mean of three replication

Table 7: Percent disease index of powdery mildew in green gram

Treat.	2017-18			2018-19			Mean of two year		
	DAS		Mean	DAS		Mean	DAS		Mean
	45	90		45	90		45	90	
M1	20.0	38.9	29.4	23.1	43.1	33.1	21.5	41.0	31.3
M2	18.5	35.4	27.0	20.9	41.1	31.0	19.7	38.3	29.0
M3	24.2	41.2	32.7	24.7	48.6	36.7	24.4	44.9	34.7

Note: Mean of three replication

Table 8: Percent disease index of alternaria leaf spot in cabbage

Treatment	Percent disease index (PDI)		
	2017-18	2018-19	Mean of two year
M1: 100% RDN	10.2	11.1	10.6
M2: 50% RDN	9.3	10.2	9.7
M3: 4t/ha	8.4	8.8	8.6

Note: Mean of three replication

Table 9: Percent disease index of purple blotch in onion

Treatment	Percent disease index (PDI)		
	2017-18	2018-19	Mean of two year
M1: 100% RDN	12.0	13.3	12.7
M2: 50% RDN	10.7	11.1	10.9
M3: 4t/ha	11.1	12.0	11.6

Note: Mean of three replication

Table 10: Percent disease index of early blight in tomato

Treatment	2017-18			2018-19			Mean of two year		
	DAT		Mean	DAT		Mean	DAT		Mean
	45	90		45	90		45	90	
M1	16.2	38.9	27.6	14.7	37.1	25.9	15.4	38.0	26.7
M2	14.4	34.4	24.4	10.0	32.2	21.1	12.2	33.3	22.8
M3	15.6	35.1	25.3	12.2	33.3	22.8	13.9	34.2	24.1

M1: 100% RDN, **M2:** 50% RDN, **M3:** 4t/ha
Note: Mean of three replication

References

1. Borkar SG, Patil BS. Performance of wheat varieties for leaf rust and Alternaria blight resistance. Indian Journal of Mycology and Plant Pathology. 1995; 25(3):280-281.
2. Horsfall JG, Barrett RW. An improved grading system for measuring plant diseases. Phytopathology. 1945; 35:655.
3. Kogan M, Pitre HN. General sampling methods for above ground populations of soybean arthropods, In: Sampling Methods in Soybean Entomology (Eds. Kogan M and Herzog DC), Springer-Verlag, New York, 1980, 30-66.
4. Magdoff RR. Building soil for better crops. Organic Matter Management. University Nebraska Press, Lincoln, USA, 1992, 176.
5. Mayee CD, Datar VV. Phytopathometry, techanical bulletin-1. Marathwada Agricultural University, Parbhani, 1986, 46.
6. Reddy RP, BV, Mathur K. Screening Techniques for Sorghum Diseases. Information: Bulletin No. 76. International Crops Research Institute for the Semi-Arid Tropics, 2007.
7. Sharma SR. Effect of fungicidal on purple blotch and bulb yield of onion. Indian Phytopathology. 1986; 39:78-82.
8. Wheeler BES. An introduction to plant disease. John Willey and Sons Ltd., London, U.K., 1969, 301.