

Original Research Article

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## Influence of Organic Manures on Number Effective Tillers per Plant, Leaf Area (LA) and Leaf Area Index (LAI) in Wheat (*Triticum aestivum* L.)

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### ABSTRACT

The Wheat crop use of inorganic fertilizers for the past 50 years without any addition of organic manures resulted in the large scale deficiency of micro nutrients which play an important role in enhancing the quality and quantity of the agriculture produce. Further nutrient losses in inorganic fertilizer is very high and loss of nutrients like NO<sub>3</sub> sometime leads to water pollution. The present experiment consist of nine treatments T<sub>1</sub>: RDF, T<sub>2</sub>: EC (1/4) basal + PM (3/4) basal, T<sub>3</sub>: FYM (1/4) basal + VC (3/4) basal, T<sub>4</sub>: FYM (1/4) basal + PM (3/4) basal, T<sub>5</sub>: EC (1/4) basal + VC (3/4) basal, T<sub>6</sub>: FYM (1/4) basal + PM (3/4) top dressing 30DAS, T<sub>7</sub>: EC (1/4) basal + VC (3/4) top dressing @ 30 DAS, T<sub>8</sub>: EC (1/4) basal + PM (3/4) top dressing at 30DAS, T<sub>9</sub>: Control. The study revealed that, among the treatments, T<sub>8</sub> treatment i.e., T<sub>8</sub>: EC (1/4) basal + PM (3/4) top dressing at 30 DAS observed the highest leaf area at 30 DAS and 60 DAS (i.e., 15.77 and 24.12) and highest leaf area index at 30 DAS and 60 DAS (i.e., 16.70 and 2.637), more number of effective tillers per plant at 60DAS and at harvest (i.e., 116.00 and 126.66).

#### Keywords

Organic manures, vermicompost and farmyard manure

#### Article Info

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### Introduction

Wheat crop is very much essential to find out the alternative to the chemical fertilizers which maintain the soil fertility and enhance the productivity of crops. Under such situation the use of organic manures in

agriculture play an important role. In this context, a keen awareness has to be created on the adoption of organic farming as a remedy to maneuver the ill effects from chemical farming. The increasing leaf area index may be due to repeated mineralization and nutrient availability of poultry manure Subbareddy *et*

al., (2008) the increasing leaf area may be due to increasing amount of protoplasm along with proteins, which lead to increase turgidity of plant cells. This resulted in the expansion of cell wall, which was manifested in the increased linear and lateral dimensions of leaves and stalk of the plant.

In organic farming, the first and foremost characteristic is protecting fertility and nutrition management (nitrogen self-sufficiency). The total nutritional consumption (NPK) from chemical fertilizers is about 20.34 million t (Arun Kumar 2009) in India. To substitute the same in organic farming, enough sources like crops residues, legume crop rotations with BNF, non-symbiotic N<sub>2</sub> fixation, animal dung and urine, composts, green manures, plant based nutrients, mineralization of nutrients, nutrient transformations, etc., are the greater options available with us on the farm.

Organic manures in agriculture add much needed organic and mineral matter to the soil. The organic matter added is an indispensable component of soil, and plays an important role in maintenance and improvement of soil fertility and productivity. The proper management of these makes it possible to increase the efficiency of use of soil and added nutrients.

## Materials and Methods

### Seed source

For the present study, seeds of wheat variety PBW-550 were obtained from Dept. of agriculture Dehradun, Uttarkhand.

### Description of variety

The wheat variety PBW 550 is a yellow rust resistant version of PBW 550. Its average plant height is 86 cm and matures in about

145 days. Its average grain yield is 23.0 quintals per acre. It is resistant to yellow and brown rusts and susceptible to loose smut.

### Design and layout

The experiment will be laid out in a Randomized block design (RBD) with three replications. The experimental details and layout plan are given below:

Crop : Wheat (*Triticum aestivum* L.).  
Variety : PBW-550  
Spacing : 22.5 cm × 10 cm  
Design : Randomized block design (RBD)  
Replications : 03  
Total treatments : 09  
Gross plot : 2.5m × 1.5m  
Irrigation channel : 0.5m

### Treatment details

T<sub>1</sub> - RDF  
T<sub>2</sub> - EC (1/4) basal + PM (3/4) basal  
T<sub>3</sub> - FYM (1/4) basal + VC (3/4) basal  
T<sub>4</sub> - FYM (1/4) basal + PM (3/4) basal  
T<sub>5</sub> - EC (1/4) basal + VC (3/4) basal  
T<sub>6</sub> - FYM (1/4) basal + PM (3/4) top dressing 30DAS  
T<sub>7</sub> - EC (1/4) basal + VC (3/4) top dressing @ 30 DAS  
T<sub>8</sub> - EC (1/4) basal + PM (3/4) top dressing at 30DAS  
T<sub>9</sub> - Control

Note 1: All organics are made equivalent to recommended dose of nitrogen (RDN)

Note 2: FYM: Farm yard manure, VC: Vermicompost, PM: Poultry manure, EC: Enriched compost

Note 3: RDF (recommended dose of fertilizers 100:75:50 kg NPK ha<sup>-1</sup>)

### Leaf area (LA) and leaf area index (LAI)

Leaf area (cm<sup>2</sup>) was computed with multiplied by length and then multiplied by correction factor 0.65n 30 DAS and 60 DAS and at harvest as given by Gomez (1976).

Leaf area index was worked out by dividing the leaf area per unit land area as given by (Sestak *et al.*, 1971).

$$\text{LAI} = \frac{\text{Leaf area per plant (cm}^2\text{)}}{\text{Ground area per plant (cm}^2\text{)}}$$

### Number of tillers plant<sup>-1</sup>

Number of tillers per metre row length from three places (marked with stick) from each plot will be counted at 60 DAS and at harvest.

### Results and Discussion

The results of experiment conducted to study the effect of organic manures on growth, yield and grain quality of wheat (*Triticum aestivum* L.) during Rabi season 2018-2019 are presented in this paper.

### Leaf area (cm<sup>2</sup>) and leaf area index

Data pertaining to Leaf Area Index (LAI) at various stages as influenced by different treatments are presented in Table no.1 and depicted in Fig: 1

The leaf area and leaf area index significantly highest among the treatments at 30 and 60 DAS respectively in T<sub>8</sub>- EC (1/4) basal + PM (3/4) top dressing @ 30 DAS (15.77, 24.12 and 1.670, 2.637 cm<sup>2</sup> respectively) recorded was on par with T<sub>6</sub>- FYM (1/4) basal + PM (3/4) top dressing @ 30 DAS (15.63, 22.12

and 1.610, 2.473 cm<sup>2</sup> respectively), T<sub>2</sub>- EC (1/4) basal + PM (3/4) basal (15.52, 22.60 and 1.583, 2.343 cm<sup>2</sup> respectively) the minimum plant height was recorded under T<sub>9</sub>- Control (12.96, 17.25 and 1.357, 1.927 cm<sup>2</sup>).

### Number effective tillers per plant

Data pertaining to number of effective tillers per plant as influenced by different treatments are presented in Table no. 2 and depicted in Fig: 2

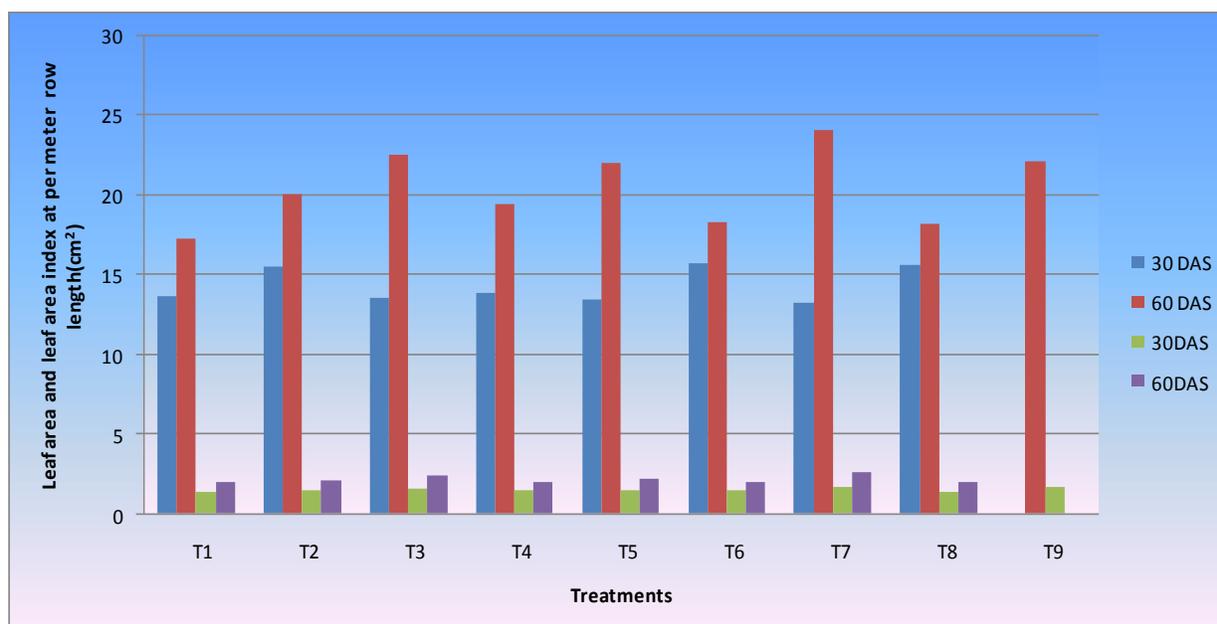
It is clearly noticed that T<sub>8</sub>- EC (1/4) basal + PM (3/4) top dressing @ 30 DAS recorded the highest numbers of effective tillers at 60 DAS (116.00) and at harvest (126.66) which was one par with T<sub>6</sub>- FYM (1/4) basal + PM (3/4) top dressing @ 30 DAS and T<sub>2</sub>- EC (1/4) basal + PM (3/4) basal at 60DAS (104.33 and 100.33 respectively) and at harvest (124 and 123.66 respectively). The lower number was recorded by T<sub>9</sub> - Control at both stages (81.66 and 102.66).

Number of effective tillers per meter row length, leaf area and leaf area index at different growth stages as influenced by organic manures is given below.

The leaf area and leaf area index significantly highest among the treatments at 30, 60, 70 DAS and at harvest, respectively in T<sub>8</sub>- EC (1/4) basal + PM (3/4) top dressing @ 30 DAS (15.77, 24.12, 1.67 & 2.63 cm respectively) recorded was on par with T<sub>6</sub>- FYM (1/4) basal + PM (3/4) top dressing @ 30 DAS (15.63, 22.12, 1.61 & 2.47 cm respectively), T<sub>2</sub>- EC (1/4) basal + PM (3/4) basal (15.52, 22.60, 1.58 & 2.34 cm respectively) the minimum was recorded under T<sub>9</sub>- Control (12.96, 17.25, 1.35 & 1.92 cm).

**Table.1** Leaf area and Leaf area index (LAI) per meter row length at different Growth stages as influenced by organic manures

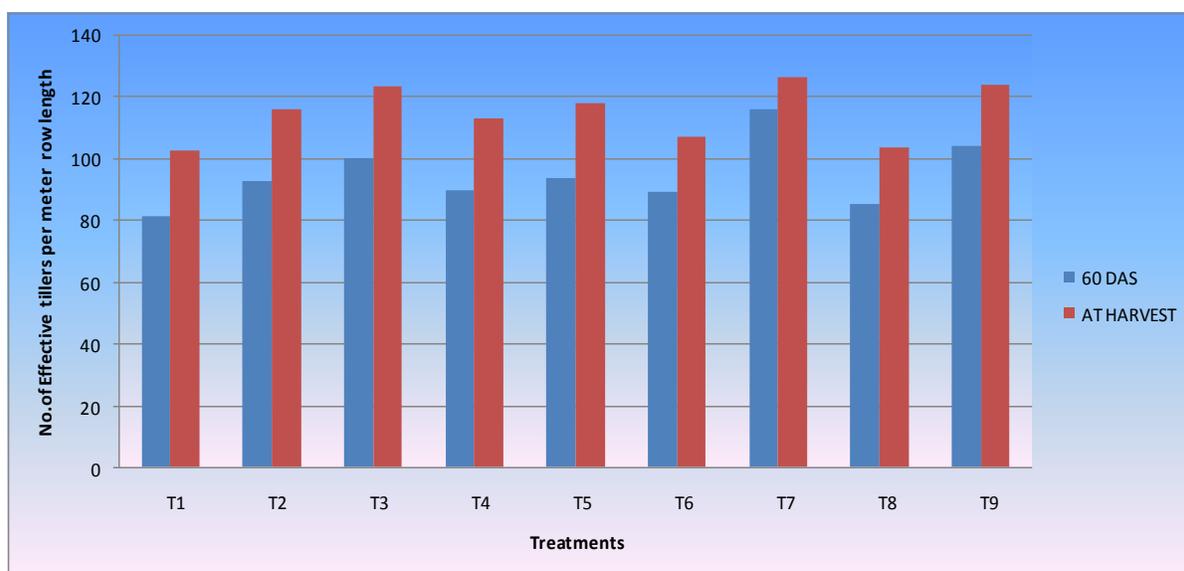
Treatments	Leaf area		Leaf area Index	
	30 DAS	60 DAS	30 DAS	60 DAS
T <sub>1</sub> - RDF	13.85	22.00	1.473	2.167
T <sub>2</sub> - EC (1/4) basal + PM (3/4) basal	15.52	22.60	1.583	2.343
T <sub>3</sub> - FYM (1/4) basal + VC (3/4) basal	13.29	18.22	1.393	1.953
T <sub>4</sub> - FYM (1/4) basal + PM (3/4) basal	13.67	20.08	1.467	2.047
T <sub>5</sub> - EC (1/4) basal + VC (3/4) basal	13.46	18.26	1.413	1.987
T <sub>6</sub> - FYM (1/4) basal + PM (3/4)top dressing @ 30 DAS	15.63	22.12	1.610	2.473
T <sub>7</sub> - EC (1/4) basal + VC (3/4) top dressing @ 30 DAS	13.56	19.48	1.450	2.013
T <sub>8</sub> - EC (1/4) basal + PM (3/4) top dressing @ 30 DAS	15.77	24.12	1.670	2.637
T <sub>9</sub> – Control	12.96	17.25	1.357	1.927
CD(p=0.05)	1.155	1.340	0.059	0.065
C.V.	4.462	3.751	2.256	1.178
S.Em±	0.382	0.443	0.019	0.022



**Fig.1** Leaf area and Leaf area index (LAI) per meter row length at different growth stages as influenced by organic manures

**Table.2** Number of effective tillers per meter row length at different growth stages as influenced by organic manures

Treatments	Number of effective tillers	
	60 DAS	At Harvest
T <sub>1</sub> - RDF	93.66	118.33
T <sub>2</sub> - EC (1/4) basal + PM (3/4) basal	100.33	123.66
T <sub>3</sub> - FYM (1/4) basal + VC (3/4) basal	85.33	104.00
T <sub>4</sub> - FYM (1/4) basal + PM (3/4) basal	93.00	116.00
T <sub>5</sub> - EC (1/4) basal + VC (3/4) basal	89.33	107.33
T <sub>6</sub> - FYM (1/4) basal + PM (3/4) top dressing @ 30 DAS	104.33	124.00
T <sub>7</sub> - EC (1/4) basal + VC (3/4) top dressing @ 30 DAS	90.00	113.00
T <sub>8</sub> - EC (1/4) basal + PM (3/4) top dressing @ 30 DAS	116.00	126.66
T <sub>9</sub> – Control	81.66	102.66
CD(p=0.05)	3.701	3.205
C.V.	2.235	1.595
S.Em±	1.224	1.060



**Fig.2** Number of effective tillers per meter row length at different growth stages as influenced by organic manures

It is clearly noticed that maximum number of effective tillers per meter row length T<sub>8</sub>- EC (1/4) basal + PM (3/4) top dressing @ 30 DAS (116.00) and at harvest (126.66) which was on par with T<sub>6</sub>- FYM (1/4) basal + PM (3/4) top dressing @ 30 DAS and T<sub>2</sub>- EC (1/4) basal + PM (3/4) basal at 60 DAS (104.33 and 100.33 respectively) and at harvest (124 and 123.66 respectively). The lower number was recorded by T<sub>9</sub>- Control at both stages as (81.66 and 102.66).

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