



***Research Paper***

**COMPARATIVE STUDIES ON GROWTH AND YIELD PARAMETERS OF  
TRANSPLANTED WHEAT (*Triticum aestivum* L.) WITH SEEDLING  
PRODUCED IN HYDROPONICS SYSTEM *VIS-A-VIS* CONVENTIONAL  
CULTIVATION**

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**Abstract**

The research was conducted to evaluate growth (vegetative and yield) characteristics of wheat cultivar (KRL-19) under hydroponic( soil-less) system and comparison with conventional system during 2011 at Ayurved Research Foundation located in Chidana, Sonapat (Haryana). Randomized block design was used with four treatment and four replications. The seeds were directly sown in conventional type and in hydroponics , seedling were grown inside controlled environment chamber of Ayurved Proggreen hydroponics machine and transplanted in soil after 7<sup>th</sup> day, 10<sup>th</sup> day and 12<sup>th</sup> day. Analysis of variance showed that there were significant differences between two systems. Hydroponics 7<sup>th</sup> day transplanted plants gave higher yield in comparison to hydroponics 10<sup>th</sup> day and 12<sup>th</sup> day and conventional.

Key words: Hydroponics, wheat, tillers and panicle.

**INTRODUCTION**

Wheat (*Triticum aestivum* L.) is the world's leading cereal grain and most important food crop. Its importance derives from the properties of wheat gluten proteins that stretch with the expansion of fermenting dough, yet coagulate and hold together when heated to produce a 'risen' loaf of bread. Wheat is utilized for making bread, unleavened bread, flour for confectionary products and breakfast cereals. Its diversity of uses, nutritive content, and storage qualities has made wheat a staple food for more than one-third of the world's population (Poehlman and Sleper, 1995). In this experiment wheat was grown in hydroponics.

Hydroponics is the art and science of growing plants without soil, by feeding it nutrient solution containing minerals which plants usually draw from the earth. The basic principle of soil-less culture is not new. Over the centuries, scientists have been producing plants in this way for physiological experiments. Thus, hydroponics has developed from the findings of experiments carried out to determine what substances make plants grow, and the composition of plants (Deutschmann, 1998).

Hydroponics, the science of growing plants without soil is accepted globally and country like Australia, New Zealand, USA, Canada are extensively using this for various research works. Progress has been extensive over the past 30 years. The two chief merits of the hydroponics

cultivation of plants are, firstly much higher crop yields, and secondly, the fact that hydroponics can be used to cultivate crops where it is normally impossible (Douglas, 1972). For this reason hydroponics is often used for a number of applications in the study of plants.

The aim of this study is evaluating of yield of the wheat cultivar in hydroponics system and its comparison with the conventional system.

#### **Materials and Method:**

In this study, seedlings of wheat cultivar KRL-19 were raised through hydroponics technology in Ayurvet Pro-green Hydroponics Machine in which environment like temperature, humidity can be controlled. Seedlings of wheat were raised inside the hydroponics chamber under optimum light, temperature and nutrients for 7 days, 10 days and 12 days during 2011 in Chidana, Sonapat (Haryana). After that produced seedlings were transplanted in the soil at 7 day, 10 day and 12 day and seed were directly sown and compared. Generally wheat is not transplanted. In this experiment late variety was used and sown very late. Experiment design was randomized block design with 4 replication with 4 treatments included conventional and hydroponics cultivation system. All the practices such as irrigation, control of weeds, pest and diseases were done regularly during growth period. During growth period and after harvesting traits were measured such as plant height, number of tillers, diameter of stem, number of days for



**Figure 1:( a.) Wheat nursery transplanted to field using mechanical transplanter (b.) Wheat crop ready to harvest**

panicle emergence, length of panicle, number of grains per panicle, whole biomass, yield /36 square meter, straw yield/acre and yield/ acre were measured. Analysis of variance was done by OPSTAT software.

#### **Result and Discussions:**

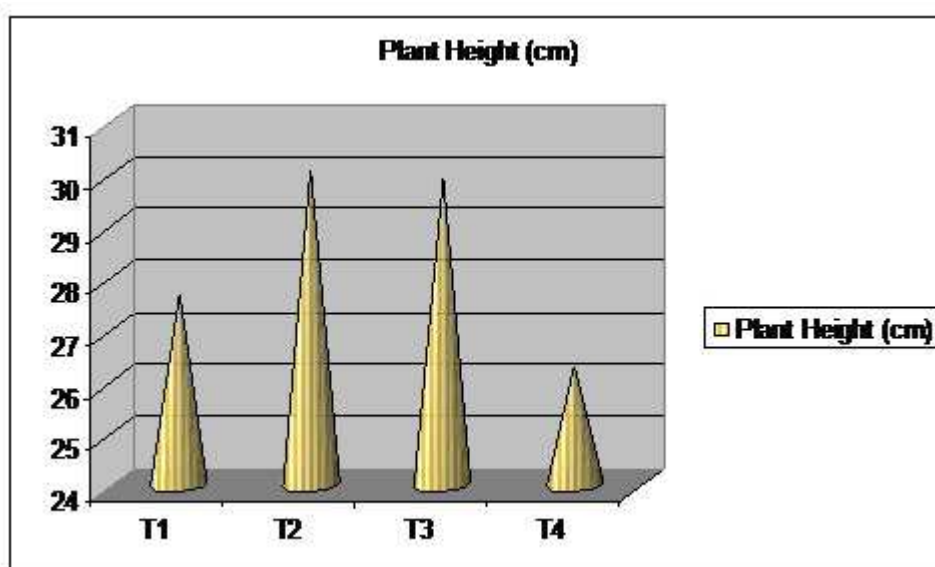
Analysis of variance showed that there were significant difference between two systems for plant height (cm), number of days of panicle emergence and yield/acre (kg). (Table1)

**Table 1: Comparison of evaluated traits in hydroponics and conventional cultivation system in wheat (Cultivar KRL-19)**

S.No	Parameters	T1	T2	T3	T4	Mean	CD
1	Plant Height (cm)	27.7	<b>30.1</b>	29.9	26.3	28.5	<b>1.59</b>
2	Number of Tillers	7.9	<b>8.2</b>	8.2	6.9	7.8	<b>3</b>
3	Diameter of Stem	<b>6.1</b>	4.5	4.5	4.1	4.8	<b>N.S.</b>
4	Number of days of Panicle emergence	83.1	74.7	<b>74.1</b>	73.7	76.4	<b>6.73</b>
5	Length of Panicle (cm)	10.6	<b>12.8</b>	12.3	11.5	11.8	<b>1</b>
6	Number of grains per Panicle	25.8	<b>26.8</b>	25.3	25.3	25.8	<b>N.S.</b>
7	Whole Biomass (Kg)	38.5	<b>39.0</b>	32.3	32.0	35.4	<b>N.S.</b>
8	Yield/36 Square m (kg)	12.2	<b>16.0</b>	13.9	14.6	14.2	<b>N.S.</b>
9	Straw Yield/Acre ( Kg)	13.1	<b>22.2</b>	21.6	19.8	19.2	<b>N.S.</b>
10	Yield/Acre (Kg)	1762.	<b>1828.</b>	1576.	1342.	1627.	<b>14.7</b>

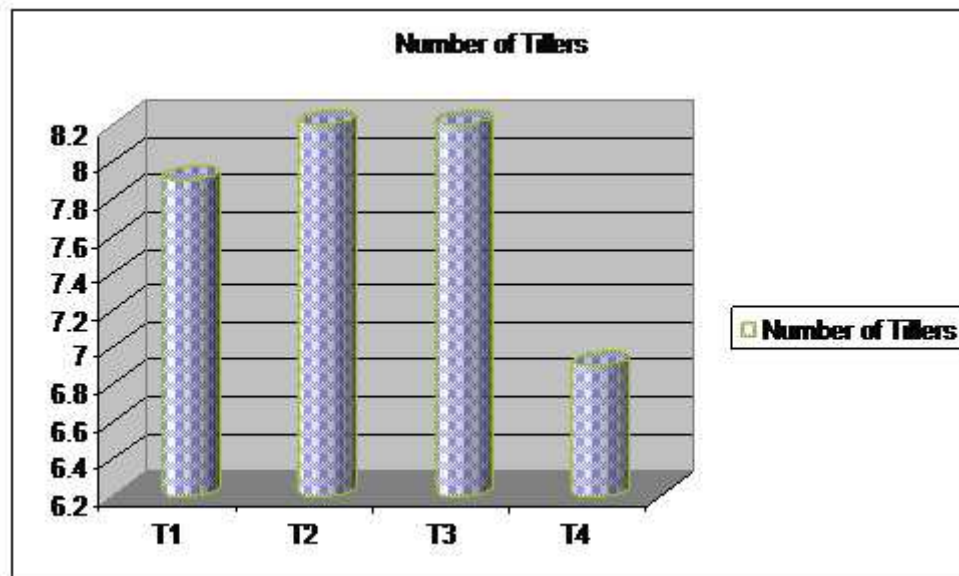
Where T1=Conventional, T2=Hydroponics 7 days, T3= Hydroponics 10 days and T4= Hydroponics 12 days

Maximum Plant height i.e. 30.1 cm was recorded in 7 day hydroponics system followed by 29.9 cm recorded in 10 day hydroponics. In hydroponics system of 7 day yield/acre is maximum i.e. 1828.6 kg. Soil-less cultivation systems frequently used in horticulture present several advantages compared with soil production. Hydroponics leads to higher production (FAO, 1990). Ritter et al. (2001) showed that the hydroponics system proved more convenient than the traditional propagation system using peat sand mixtures and mineral fertilizers.

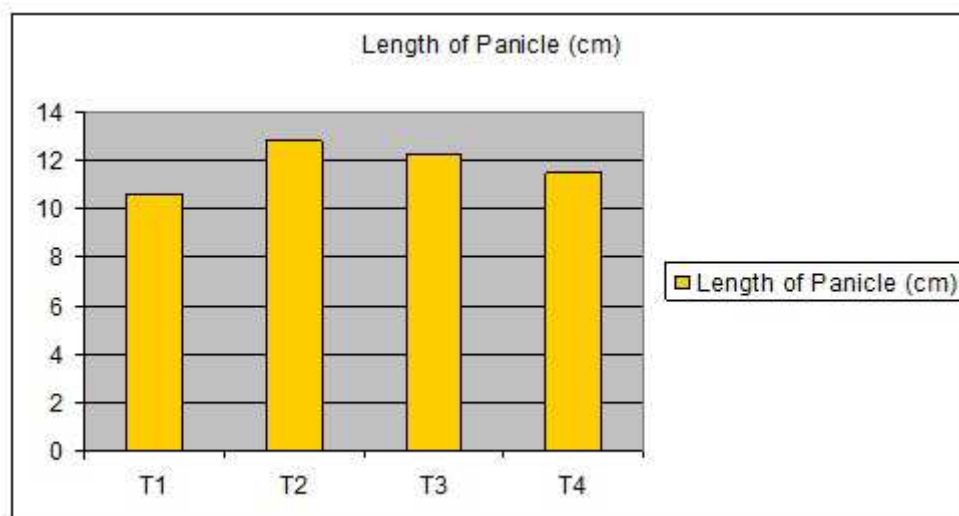


Where T1=Conventional, T2=Hydroponics 7 days, T3= Hydroponics 10 days and T4= Hydroponics 12 days

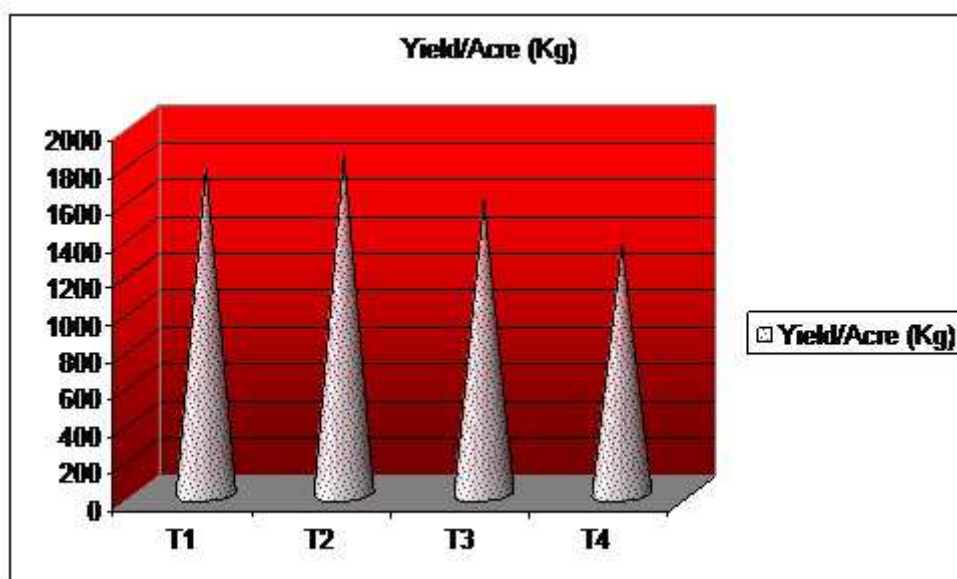
**Figure 2: Comparison of plant height in hydroponics and conventional cultivation system in wheat (Cultivar KRL-19)**



Where T1=Conventional, T2=Hydroponics 7 days, T3= Hydroponics 10 days and T4= Hydroponics 12 days  
Figure 3: Comparison of number of tillers in hydroponics and conventional cultivation system in wheat (Cultivar KRL-19)



Where T1=Conventional, T2=Hydroponics 7 days, T3= Hydroponics 10 days and T4= Hydroponics 12 days  
Figure 4: Comparison of length of panicle in hydroponics and conventional cultivation system in wheat (Cultivar KRL-19)



Where T1=Conventional, T2=Hydroponics 7 days, T3= Hydroponics 10 days and T4= Hydroponics 12 days

Figure 5: Comparison of yield/acre in hydroponics and conventional cultivation system in wheat (Cultivar KRL-19)

## CONCLUSIONS

Experiment suggests that maximum Plant height i.e. 30.1 cm was recorded in 7 day hydroponics system followed by 29.9 cm recorded in 10 day hydroponics. In hydroponics system of 7 day no. of tillers and panicle length was also recorded maximum i.e. .8 and 12.8 respectively kg In hydroponics system of 7 day yield/acre is maximum i.e. 1828.6 kg. Hydroponics system of cultivation is better than the conventional system because nutrients are readily available in aqueous solution and easily absorbed by plants and younger seedlings adopt and acclimatize well in the soil and able to cope up with environmental stress and climate change. Under late sown condition the KRL-19 performed better through hydroponics than conventional

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