SYNOPSIS ON

Pre-Dissertation

AGR 596

"The effect of sowing dates on growth parameter and yield of wheat *(Triticum aestivm* L.*)"*

Submitted To

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CERTIFICATE

This is to certified that this synopsis entitled **"The effect of sowing dates on growth parameter and yield of wheat *(Triticum aestivum* L.)"** submitted in partial fulfilment of requirements for degree – Master of Science in Agronomy by **Dinkle Raina, Registration no. 11718958** to Department of Agronomy, School of Agriculture, Lovely Professional University, has been formulated and finalized by the student herself on the subject.

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DECLARATION

I hereby declare that the project work entitled **--The effect of sowing dates on growth parameter and yield of wheat (*Triticum aestivum*L.)''**is an authentic recordof my work carried at **Lovely Professional University** as requirements of project work for the award of degree -Master of Science in Agronomy, under the guidance of **Dr.Geeta kandpal** Assistant Professor, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India.

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INTRODUCTION

Wheat is the one of the most important cereal crops around the world. Many species of wheat which together make up the genus ***Triticum*** the most widely grown is common wheat (*T. aestivum*). Wheat is known as the "King of cereals" for centuries and it retains the pride of place even today. Wheat is on the number one food grain consumed directly by human beings and is estimated that more than 35 per cent of the world population depends on wheat, as it supplies more nutrients particularly, essential amino acids than any other single crop**.** Wheat is the second most important crop in India next to rice .Wheat is one of the most prominent food sources in many parts of the world. It is one of the most versatile crops among the cereal family stood third in position after rice with respect to area and productivity globally **(Shah and Pamir 2009).** Wheat is considered to be most vital cereal crop for majority of global population belonging to Poaceae (Gramineae), of grass family. It is one of the staple food crop of nearly about two billion people, 36% of total world population which comprises of 55% of carbohydrates and food calories about 20% consumed all over the world. **(Breiman and Gaur, 1995)** Present statistical position of India in wheat production is second with a production of 80.4 million tons during 2008-09 in an area of 28 M ha **(Feldman, 2001).**

Wheat cultivation in Karnataka is unique wherein all three cultivated species *i.e. T. aestivum T. durum* and *T. dicoccum* are grown in relatively higher temperature particularly during its reproductive phase. Also major area is under rainfed condition. Productivity is very low as compared to national average. This is because of non availability of longer cool growing period (short winter). Wheat is basically a long day crop of the temperate region and requires relatively low temperature for satisfactory growth. **(Singh, 2009)** from Allahabad reported that wheat requires 20-25ºC for germination, 16 to 20 ºC for tillering, 20 to 23 ºC for accelerated growth and 23 to 25 ºC for proper grain filling stages for successful growth and yield. Among the climatic parameters, temperature plays a vital role in determining the sowing dates and consequently the duration of different phenophase, which affect the crop productivity **(Tewari and Singh, 1993).**

Ansary *et al.*, (1989). Delay sowing suppressed the yield. This is caused by reduction in the yield contributing traits like number of tillers, number of grains per spike and grain yield.

Rajput and Verma , (1994) observed that normal sowing gave higher grain yield than late sowing. Early sowing always produces higher yield than late sowing. Each day delay in sowing from 20th November decreases grain yield @39 kgha-1 per day **(Singh and Uttam**, **1999).** According to **Shafiq, (2004**) early sowing enhanced germination per unit area, plant height, spikelets per spike, grains per spike and 1000-grain weight over late sowing.

Different types of environmental factors affect the growth stages of the wheat. Many high yielding varieties have been evolved and recommended for general cultivation in the past. These varieties are loosing their yield potential due to changes in various edaphic and environmental conditions. Therefore, continuous selection of high yielding genotypes with midrange of adaptability to edaphic and environmental conditions is very essential to increase yield per hectare. Average global temperatures have increased over the last few decades with continuous rising trend, along with a greater frequency of extremely hot days during reproductive phase. Such events have already been reported from major wheat growing regions of the world. Attributing the changes in observed yield to a single factor such as temperature is not possible due to the confounding effects of other climatic (abiotic) factors such as rainfall, radiation and changes in management factors such as improved varieties, increased nutrition and new cropping technologies. Higher temperature during its vegetative or reproductive growth adversely affects the onset and duration of phenol phases and yield of crop. It is therefore, essential to have knowledge of the exact duration of different developmental phases in a particular environment and their association with yield determinants for achieving high yield. Growing Degree Day is a good estimator of wheat growth stages **(Baueret *et al*., 1985**). Accumulation of degree days for each stage of development is relatively constant and independent of sowing date **(Castillo and Santibanez, 1987).**

Scope of study-

1 To know the effect of wheat with different sowing dates and its effect on yield.

2. Effect of sowing dates on morphological character.

3. Effect of sowing dates on physiological attributes

REVIEW OF LITERATURE

Williams, (1980) from New York reported that the sowing periods coinciding with critical stages of wheat plant development greatly influence yield. Heat stress is the major limiting factor for high productivity and adaptation of crop to stress environment. Temperature is very important component, which determines sowing time and the productivity of wheat. The sowing date becomes more important especially under the short and mild winter where atmospheric temperature is not so congenial for the growth and development of wheat particularly in Peninsular India.

Gifford *et al.*, (1984) observed that crop growth was dependent on the ability of canopy to intercept incoming radiation, which was a function of canopy architecture and its conversion to biomass. **Biscoe and Gallagher, (1997)** from London observed the close relationship between biomass production and the amount of PAR intercepted by crop canopy in many crop species. A change in sowing dates and optimum temperature during its vegetative or reproductive growth adversely affects the initiation and duration of different phenophases and finally yields of the crop **(Pragyan Kumari *et al.*, 2009).**

In the sub-tropics (South Eastern Asia), wheat yields are very sensitive to sowing dates. At 28º N the simulations showed that the optimal sowing date is between 15th October and 15thNovember and for each day's delay in sowing, grain yield was reduced sharply by 50 kg ha-1**(Agarwal, 1988).**

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Yield attributes and yield

Singh *et al.*, (1985) reported that late sown (6th December) wheat resulted in lower grain yield than crop sown on 6th and 21st November. **Behera and Jeans, (1998)** observed that a unit raise in temperature beyond 27.3 ºC during the grain filling period shortened the maturity period by 2.64 days.

Aswinikumar Behera, (1994) on sandy loam soil of Chiplima reported that grain yield and allthe yield attributes were significantly influenced by sowing dates. The crop sown on 11th December sowing recorded 37.78 per cent lower grain yield compared to17th November (41.1 q ha-1) because of reduced grains ear-1 and test weight. He also reported that high temperature during later part of the crop growth in late sowing caused forced maturity of the crop and resulted in lower test weight, less number of filled grains ear-1 and ultimately led to lower grain yield.

Effect of sowing date:

Sowing date is one of the important non-cash input for successful crop production in all crops. Proper growth of the crop is obtained only when the crop is sown at Width =21m appropriate time soaps to provide the optimum environmental factors for plant growth. Sowing date plays a very important role in harnessing the maximum possible yield potential of any crop. The photosynthetic potential of a plant is influenced by sowing environment. A plant shows its maximum yield when it is sown in optimum date. Optimum date may vary according to place and variety. Sowing at optimum date prevent pathogen attack and weed infestation. Effect of sowing after optimum date result in dramatic decrease in grain yield because the days spent in vegetative growth decreases and decline in various growth parameters and yield components deviate leading to yield reduction

Growth and development

Dogiwal *et al.*, (2003) observed that total plant biomass and its portioning into different plant parts were reduced significantly at all growth stages with each 30 days successive delay in sowing from 10th November to 10th January.

Singh *et al.*, (1985) found that late sowing of wheat varieties on 6th December resulted in a significant decrease of 21 and 18 per cent grain yield compared to 6th and 21st November, respectively. **Girothia *et al.*, (1987)** observed that the late sown wheat (6th to 10th December) resulted insignificantly lower test weight, grain and straw yields than the normal sown wheat crop (15th to 20thNovember). In the sub-tropics, wheat yields are very sensitive to sowing dates. In silty clay loam soil of Palampur (HP), sowing during 1st week of November produced the highest grain and straw yields and decreased drastically with the delay in sowing which was due to the reduction in leaf area index and number of effective tillers **(Sharma and Chakor, 1989).**

Naik *et al.*, (1991) observed that the crop sown on 15th December produced significantly dwarf plants coupled with minimum number of spikelets and grains ear-1 than crop sown on 31st October and18th November. Grain yield was significantly higher with the normal sowing than early and late sowing. Straw yield was higher in normal and late sowing than in early sowing. Late sowing variety significantly reduced the grain yield in all the condition **Jain *et al.*, (1992).**

MATERIALS AND METHODS

Name of experiment: "The effect of sowing dates on growth parameter and yield of wheat (*Triticum aestivum* L.*)*".

Location: Location of the Experiment will be conducted at the field of Lovely Professional University; Phagwara situated geographically at 31°14'48.0"N 75°41'45.0"E and 252 m above sea level. It falls under central plain zone of agro climatic zones of Punjab.

Details of Layout:

i Design= RBD (Randomized Block Design)

ii. Varieties = HD-3086, HD-2967, HD-2851.

iii. Treatments = 3

iv. Replications = 3

v. Total number of plots = 18

vi. Main irrigation channel = 1

vii. Sub irrigation channel = 2

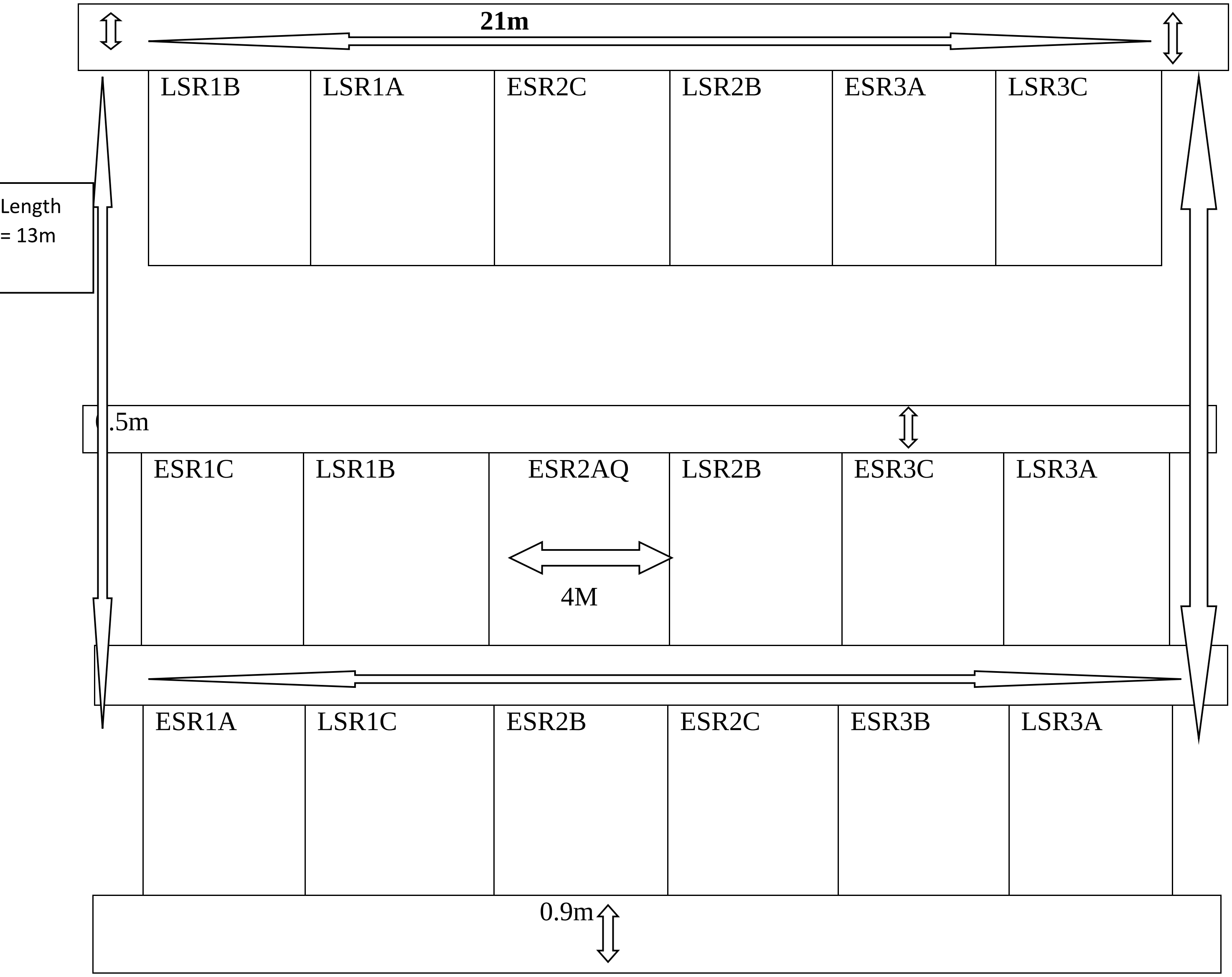
viii Spacing =25 cm

ix. Number of irrigation = 5

x. Size of each plot = 12

Experimental detail:

Field Layout



Where ES= Early sown LS= Late sown

A= B= C=

R1= Replication 1
R2= Replication 2
R3= Replication 3

Collection of soil samples:

Soil Analysis:

Soil samples will be taken before crop sowing to check the soil pH, organic carbon, electric conductivity, N, P, K and Fe ratio present in soil.

Initial soil (Before sowing): initial soil samples will be analyzed for pH, EC, Organic C, available N,P and K and Fe amount present in soil.

S. N.	**Test parameter**	**Method**	**References**
1	pH (1:2.5)	Glass electrode	Sparks (1996)
2	EC (1:2.5)	Conductivity meter	Sparks (1996)
3	Organic C	Wet digestion	Walkley and Black (1934)
4	Available N	Alkaline potassium permanganate method	Subbiah&Asija (1956)
5	Available P	Olsen's Method	Olsen *et al*. (1954)
6	Available K	Flame photometer	Jackson (1973)

1. **pH:** pH is a logarithmic scale used to specify the acidity or basicity of an aqueous solution. It is approximately the negative of the base 10 logrithm of the molar concentrations, measured in units of moles per liter of hydrogen ions.

2. EC: Electrical conductivity a measure of a materials ability to conduct an electrical current.soil electrical conductivity is a measurement that correlates with soil properties that affect crop productivity, including soil texture, cation exchange capacity, drainage conditions, organic matter level, salinity, and subsoil characteristics.

3. Estimation of chlorophyll content:

Chlorophyll content was estimated in freshly harvested leaves at active tillering and flowering stage by DMSO method.

i. To estimate chlorophyll content 50 mg of finely chopped leaves were taken in test tube in triplicate.

ii. Add 10 ml DMSO in each test tube.

iii. Incubate the sample at 65 degre c for 3 hours in an oven.

iv After incubation of 3 hours absorbance of sample were determined at 663 and 645 mm using a UV spectrophotometer against pure DMSO as a blank. The chlorophyll content was then calculated by using the formula.

$$\text{Chlorophyll a} = \frac{(12.7Xa663-2.63xa645)x\ V}{\text{Weight (g) x1000}}$$

$$\text{Chlorophyll b} = \frac{(22.9XA645-4.48XA663)xV}{\text{Weight (g) x1000}}$$

$$\text{Total Chlorophyll} = \frac{(20.2XA645-8.02XA663)XV}{\text{Weight (g) x1000}}$$

Table 1: Photograph taken at vegetative stage

Table 2: Photograph taken at reproductive stage

Table 3: Photograph taken at Maturity stage

OBSERVATION TO BE RECORDED

Growth attributes

Different growth parameters were taken at different growing stages

i. Plant height (cm)
ii. No. of leaves per plant
iii. pH
iv. Available Nitrogen
v. Available Phosphorus
vi. Available Potassium
vii. EC (Electrical conductivity)

viii. Leaf length
ix. No of leaves
x. Total no of branches
xi. Leaf length
xii. Leaf width
xiii. Spikelet length
xiv. Chlorophyll content

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