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MEIOTIC STUDIES OF *PHALARIS MINOR* (RETZ.) POACEAE

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ABSTRACT
Phalaris minor (Retz.) is an annual weed, which infests several crops during the winter season, particularly the wheat crops. Meiotic studies revealed a chromosome number of n=14 (2n=28) for this species, which is in agreement with the various previous reports for this species. Small canarygrass and littleseed canarygrass are other names for the self-pollinated annual grass plant *Phalaris minor*. For meiotic studies, young panicles (inside of flag leaf) were collected in the early morning between 9-11 am and immediately fixed in a freshly prepared Carnoy's fixative (composed of 1:3 acetic alcohol solution) for 24 hours. In this present investigation the prominent chromosomal aberrations were stickiness, bridges, laggards at metaphase and at anaphase and disturbed polarity were also reported. The overall frequency of meiotic aberrations at various stages of meiosis indicated that metaphase aberrations were more common followed by anaphase and telophase aberrations. The overall frequency of meiotic aberrations at various stages of meiosis indicated that metaphase aberrations were more common followed by anaphase and telophase aberrations.

Keywords: *Meiosis, Phalaris minor (Retz.), Chromosome*

INTRODUCTION
Phalaris minor (Retz.) is an annual grass weed. It is the most troublesome weed in the wheat crop mainly in a rice-wheat system, which is a predominant system in Indo-gangetic plains of India. Nearly 40 per cent of the total wheat area of the country is covered under this system. Most of these areas are heavily infested by *P. minor* which emerges with the germinating wheat crop, competes for water and nutrient requirement and reduces the grain yield (Bhan and Chaudhary, 1976).
Surveys of wheat in the states of Punjab (Bir and Sidhu, 1979) and Haryana (Mehra and Gill 1988) have established the prevalence of *P. minor*. Globally, *P. minor* has been reported in more than 60 countries of the world, widely covering all the continents except Polar Regions (Singh *et.al*.,). During recent years, this weed has become a main constraint in realizing the yield potential of this crop. An exploratory survey conducted jointly by the CIIMYT, IRRI and Haryana Agricultural University in Kamal and Kurukshetra district of Haryana (India), also concluded that *P. minor* was the major factor responsible for regional productivity loss (Harrington, 1992).
One of the largest groups of flowering plants is the Poaceae, often known as the Gramineae. The grass family exhibits significant variation due to its extensive distribution across a variety of environments, and it can endure even the most harsh climatic conditions. The grasses stretch up to high elevation, where they are elevated by blooming plants, and are significantly more prevalent in mountainous areas. The grass family's importance for both economic and ecological reasons has generated a lot of interest in its systematic and evolutionary investigations. In plant genetic research, chromosomal diversity analysis is of ultimate and fundamental importance, the use of cytogenetic has led to a significant increase in our knowledge as well as our innovative understanding of the genomic structure and behavior of species.

MATERIALS AND METHODS
For meiotic analysis the plant material was collected from the wheat field. Young flower buds were fixed in 1:3 (acetic acid: absolute alcohol) mixture for 24 h. The anthers of appropriate size were squashed in

2% iron-acetocarmine. Observations on meiotic chromosomes behavior were recorded from temporary slides. Photographs were taken using temporary preparations with a Leica photographic microscope.

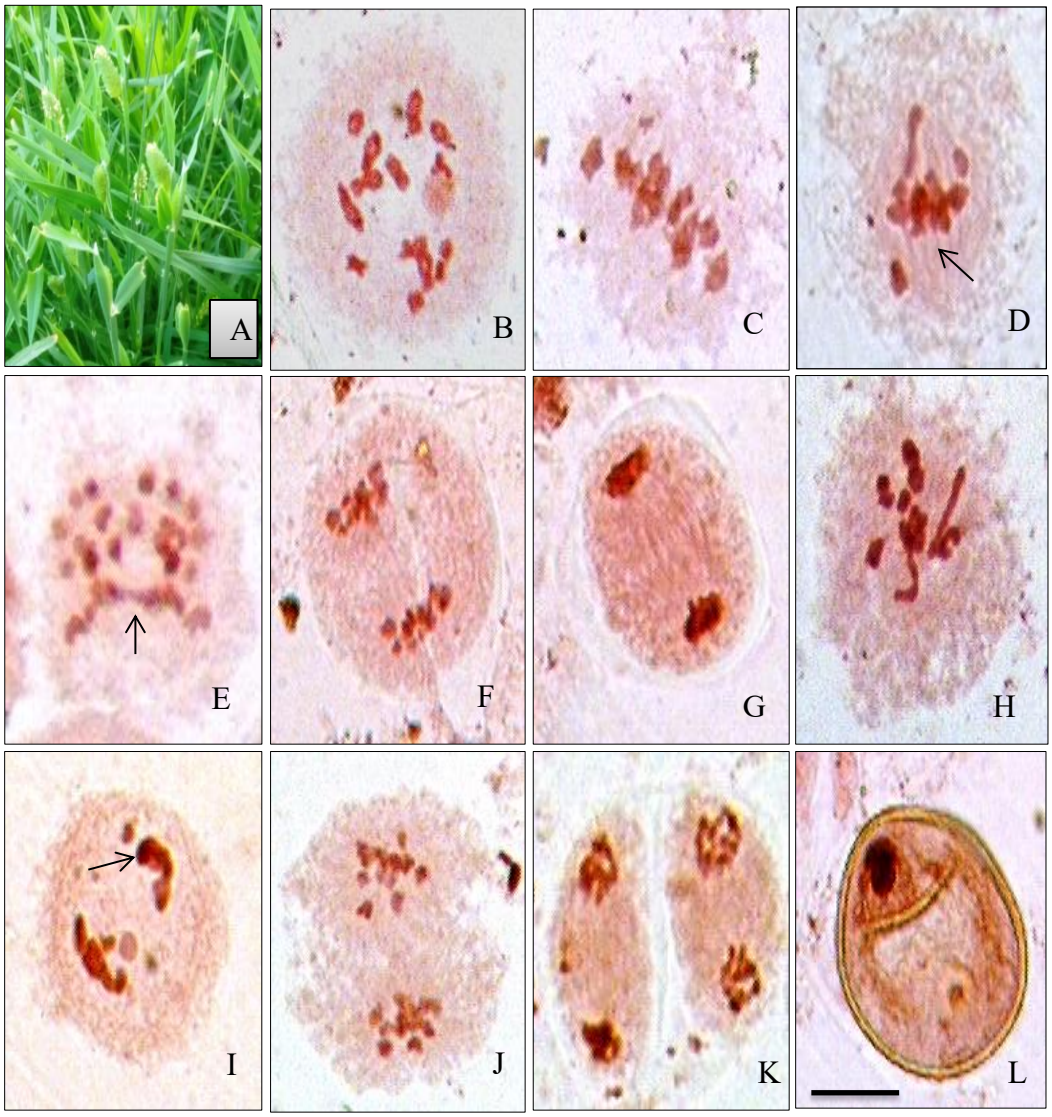

Figure 1: ***Phalaris minor*** **A**. Morphology **B**. Diakinesis n=14 (2n=28) **C**. Metaphase-I **D**. Stickiness at metaphase-I **E**. Anaphase with bridge **F**. Anaphase-I **G**. Telophase-I **H**. Metaphase-II **I**. Sticky metaphase-II **J**. Anaphase-II **K**. Telophase-II **L**. Pollen. (Bar=10µm)

RESULTS AND DISCUSSION

The PMCs analyzed at diakinesis/metaphase-I had 14 bivalents (2*n*=28) (Figure B). Anaphase-I had a normal distribution of chromosomes (14:14) (Figure E). Telophase-I, metaphase-II, anaphase-II and telophase-II were also observed. The plants showed rod shaped chromosome at diakinesis metaphase I, metaphase II, anaphase II with laggards, telophase II with bridges, telophase II with disturbed polarity, tetrad and pollen grains. Bridge and fragments at anaphase-I and telophase- II (Figure I & J) in meiotic

division. At anaphase/telophase-I and II, more than 100 PMCs analyzed in the plant were found to have various configurations of chromosomes.

The chromosome (term coin by Waldeyer, 1888) a road like body is especially an organized structure of DNA and histone proteins residing in the cell nucleus of a eukaryotic organism. The study of chromosomes structure, function and its abnormalities is the main aspect of discipline called Cytogenetics. So, the cytogenetic study the chromosome counts and their structure by stating dividing cells with certain dyes and finally scrutinizing them with microscope. The chromosomes carry the genetic information which passes from parents to offspring's through meiotic division. The chromosome number is specific to a particular species which may diverge, due to mechanisms like polyploidy, aneuploidy, aneusomy etc.

In present cytogenetic studies done in *Phalaris minor*. In India, various reports on chromosome studies were made by many researchers on different members of the grass family in the last few decades. They include, Mehra *et al*., 1968; Mehra and Sunder 1970; Gupta 1971; Mehra and Sharma 1975; Sharma 1979; Mehra and Sharma 1973; Gupta and Gupta 2008; Singhal *et al*. 2014. Meiosis is a reduction division which generates four haploid cells from a single diploid parental cell (PMC). The meiosis is a dynamic process during which several cellular event take place such as DNA replication chromosome pairing in recombination chromosome disjunction and lastly cytokinesis. These processes are useful in maintaining the cell integrity and genomic constitution as well as provide inter specific genetic variability.

CONCLUSIONS

The species under study were cytological stable as they revealed normal meiosis with regular bivalent formation. In the present investigation a vast array of meiotic study were recorded in the plants raised from the field. Different types of chromosomal aberrations viz., stickiness, (at metaphase I/II), bridges, laggards (at anaphase I/II) and disturbed polarity, (at telophase I/II) as observed in the present investigation, have also been reported by many workers in different plants (Mehra and Sharma 1975; Sharma 1979; Mehra and Sharma 1973).

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