

Effect of induced autotetraploidy in blond psyllium

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SUMMARY

Out of total species of *Plantago* only two species, *P. ovata* Forsk. and *P. psyllium* are economically important. In the present study, for almost all the morphological characters, tetraploids showed superiority over their diploid counterparts except number of seeds per spike. Tetraploids were late in 50% flowering by 13.30% number of days than diploids. Pollen size was larger (31.55%) than that of diploids, but pollen viability decreased by 16.53%. Size of stomata was bigger in tetraploids. 72% of cells showed 1 nucleolar bivalents and 28% showed 2 nucleolar bivalents. Despite the high bivalent frequency, segregation of chromosomes was irregular as a consequence of which fertility was reduced. A rigorous selection for number of traits showed superiority will increase seed yield per plant which will boost considerably the superiority of crop at tetraploid level.

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Plantago ovata Forsk; commonly known as Isabgol and commercially as blond psyllium is an important medicinal plant which belongs to family Plantagenaceae and the genus *Plantago*. It is the only cultivated species in the genus and is extensively grown in North Gujarat region (Gupta, 1982). In the recent past, the demand for medicinal plants in the international market has increased (Anonymous, 2001).

Despite its tremendous economics importance, very limited scientific efforts have been made to enhance the productivity of this crop through genetic manipulation. Conventional methods of breeding have not been very successful with this crop and still the crop suffers with many inherent drawbacks and is prone to various biotic and abiotic stresses. Its genetic improvement is hindered by the unique floral characteristics, narrow genetic base on account of low chromosome number, small size of chromosomes, lot of heterochromatin and less genetic recombination (Richards, 1986). However, if India is to retain the monopoly in the production of this important foreign exchange earning commodity, there is an urgent need for evolving high yielding strain an aspect altogether neglected so far. Since commercially important part is

the husk, its productivity can be enhanced by boosting the seed yield and increasing the seed size and volume. For increasing the seed volume, polyploidy breeding was initiated in the year 1967. Since separation of husk is far better in larger than in smaller seeds, thus polyploidy is likely to increase the out turn of the husk yield. Other reason for resorting to polyploidy breeding is that the crop is cross-pollinated, low number diploid ($n=4$) and belonged to a genus in which there already exists potentiality of natural polyploidy up to dodecaploid level ($2n=72$ with $x=6$). Thus, the species fulfils some of the important prerequisites for induction of successful polyploidy.

MATERIALS AND METHODS

Study was carried out in the Department of Agricultural Botany, Anand Agricultural University, Anand 2008-09. For induction of polyploidy, the seeds were soaked in the water and allowed to swell over night. Mucilage was then removed by rubbing the swelled seeds in a muslin cloth with hands. 100 seed were treated with colchicines solution of 0.2%, 0.5%, 1.0%, 1.5% and 2.0%. Efforts to induce autotetraploidy *P. ovata* were made by treating 100 germinating seeds with different colchicine concentration. Only eight tetraploid plants were obtained in the treatment seed with 0.5% of colchicine solution for 48 hours in variety GI-2. Their autotetraploid status was confirmed by conducting chromosome counts on dividing pollen mother cells (PMCs). Plants that were confirmed as cytologically polyploids were selected and further observations were recorded for morphological, floral

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