



Effect of Deproteinised Juice (DPJ) for the Study of Chromosomal Abnormalities in Onion Root Tips (Mitosis)

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Abstract:

The deproteinised juice (DPJ) is also referred as 'Whey' or 'Liquor' which is left after the extraction of protein from juice. It contains proximate amount of non protein nitrogen, soluble carbohydrates, calcium and potassium as suggested by Reddy (1986). The DPJ can be used as a fertilizer for seed germination and growth of plants. It is also suggested that the low concentration of DPJ can induce the chromosomal abnormalities in onion root tips. During the present investigation some wild and cultivated plant species (*Brassica juncea*, *Brassica napus*, *Chenopodium album*, *Goniocaulon indicum*, *Brassica oleracea*, *Celosia argentea*, *Vigna trilobata*, *Digera muricata*, *Tridax procumbens* and *Ocimum americanum*) have been used for the preparation of deproteinised juice (DPJ) and the effect of these DPJ has been studied for mitosis in onion root tips.

Keywords:-Deproteinised Juice (DPJ), Mitosis, Chromosomal abnormalities etc.

Introduction:

The technique for extraction of protein from green leaves has been suggested by Pirie (1942) now becoming popular as "Green Crop Fractionation" (GCF). The process of GCF consists of pulping the green material, expressing the juice and precipitating the proteins by heat. Thus the process of GCF results into four fractions, namely Leaf juice (Leaf extract), Pressed crop residue (PC), Leaf protein concentrate (LPC) and Deproteinised juice (DPJ).

The DPJ is the fourth and last product of green crop fractionation process. During preparation of LPC, the LPC can be separated from remaining part of the juice i.e. deprotenised juice (DPJ), by filtration through a simple cotton or canvas cloth. The DPJ is a by-product of GCF system, which is produced in large volume. This brown colored watery juice is also known as "Whey" or "Liquor."

In order to avoid local environmental bio-pollution due to the random disposal of DPJ and to make the process of GCF more economical and efficient, its proper use has to be made (Pirie, 1942).

It is well known that, the DPJ contains biologically active substances like sugars, carbohydrates, free amino acids, amides, minerals, vitamins and other water soluble components. The dry matter of the DPJ contains 40% carbohydrates and 3% nitrogen as reported by Pirie (1971). Various workers suggested the use of DPJ as a fertilizer or manure for germination and growth of plants (Dakore, 1985; Ajaykumar and Mungikar, 1990a). However, some other workers also suggested that the DPJ can induce the chromosomal abnormalities (Jadhav and Mungikar, 1998a). In the present investigation attempts were made to study the effect of different DPJ (*Brassica juncea*, *Brassica napus*, *Chenopodium album*, *Goniocaulon indicum*, *Brassica oleracea*, *Celosia argentea*, *Vigna trilobata*, *Digera muricata*,





Tridax procumbens and *Ocimum americanum*) at various concentrations (0.5%, 1.0%, 1.5%, 2.0% and 2.5%) on onion root tips.

Material and Methods:-

Preparation of DPJ solution: - The different concentrations of deproteinised juice solution (0.5%, 1.0%, 1.5%, 2.0% and 2.5%) were prepared by dissolving 0.5g to 2.5g of dry DPJ in 100ml distilled water. The DPJ solutions were filtered and used.

Onion Root Tips: - An onion bulbs were kept on a small beaker containing distilled water, the bulbs were pushed half inside the beaker. After 2-3 days, the roots were appeared and when it attained the length of 1-1.5 cm they were transferred to a DPJ solution of 0.5%, 1%, 1.5%, 2% and 2.5 % concentration. The onion bulbs having root tips were soaked for 24 hours in the DPJ solution. The root tips were cut and washed with distilled water and fixed in Carnoys fixative fluid (1:3) glacial acetic acid and absolute alcohol respectively with traces of ferric chloride for 24 hours and stored in 70% alcohol at 10°C until required.

Procedure

The fixed root tips were hydrolyzed in 1N HCl for 7-10min. they were washed with distilled water for 2-3 min. and kept in mordant (1.5% iron alum) for 5-7 min. and washed again with distilled water. Later these root tips were transferred to aqueous solution of haematoxylin (1.5%) where they were stained for 7-10 min. and squashed carefully in 45% acetic acid and slides were sealed with wax. Mitotic phases were utilized for scoring chromosomal abnormalities. Chromosomal abnormalities considered were bridge, laggard, fragments and precocious movement. They were screened from at least 500 cells from 10 tips selected at random in each treatment. The chromosomal abnormalities were scored from the temporary squashed micropreparations. Temporary slides after screening were made permanent using a butanol acetic acid series (Darlington and LaCour, 1976).

Result and Discussion:

The effect of DPJ on onion root tips was studied using chromosomal aberrations as criteria during mitotic cell division and the results obtained during the investigation are presented in Figure 1-3.

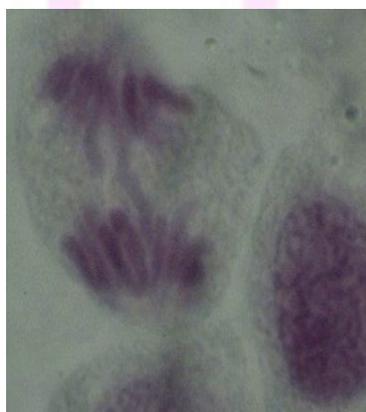


Figure. 1

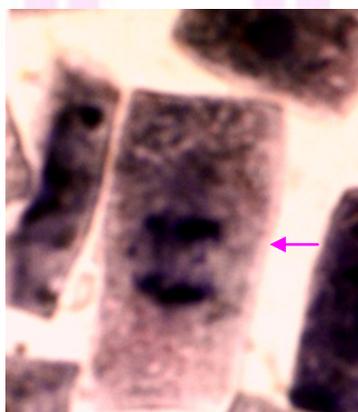


Figure. 2

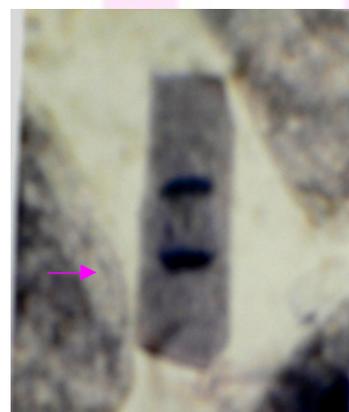


Figure. 3



Effect of DPJ (1%) on onion root tips mitosis

Figure. 1-Mitotic Anaphase; **Figure. 2-** Mitotic Anaphase with bridge;

Figure. 3- Mitotic Anaphase with Lagging Chromosome

Conclusion:

In the present investigation the treatment of low concentration of DPJ (1%) induce the chromosomal aberration like bridges and lagging chromosome in onion root tips during mitotic cell division.

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