

Antimitotic activity of leaves of datura species

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ABSTRACT

In the present study we have utilized the gram seed method *Allium cepa* root tip meristem model to evaluate *Datura Metel* Linn and *Datura Innoxia* Mill (family-solanaceae). Preliminary antimitotic screening was done using *Allium cepa* root tip assay and bengal gram seed method. The leaves obtained from plant part-dry leaves were extracted with various solvents such as petroleum ether, chloroform, ethanol, Aqueous. But most suitable activity is found in aqueous Extract. The pronounced antimitotic activity of *Datura Metel* Linn and *Datura Innoxia* Mill was due to its potential antioxidant property especially by the key role of phytochemicals such as alkaloids. Thus in future it will be interesting not only to isolate the active chemical constituent but also to determine the mechanism of action.

KEY WORDS: *Datura Metel* L, *Datura Innoxia* Mill, Bengal Gram Seed, *Allium Cepa* Root, Antimitotic Activity

INTRODUCTION

A wide variety of anti-cancer drugs exhibit cytotoxic effect by interfering with cell-cycle kinetics. These drugs are effective against cells that are proliferating and produce cytotoxic effect either by damaging the DNA during the S-phase of the cell cycle or by blocking the formation of the mitotic spindle in M-phase (Gali-Muhtasib et al, 2002). However, most of the cytotoxic drugs exhibit serious side effects (Powis 1983). Hence, there is a need for drugs that are equally efficacious but have lesser side effects. *Allium test* has been extremely useful in biological monitoring and determination of geno toxicity and pollution. It has been widely used for the evaluation of cytotoxicity and antimitotic activity of various compounds (Sehgal *et al.*, 2006) *Allium cepa* bulbs are easy to store and handle and root tip cells constitute a convenient

system for macroscopic growth (EC 50 values) as well as microscopic parameters (C. mitosis, stickiness, chromosome breaks). The advantage of this method is less expensive with fast and easy to handle, it also yields reliable results (Rank J., 2003).

In present work an attempt has been made to study the pharmacognosy of the traditional or tribal medicine i.e. *Datura Metel* L and *Datura Innoxia* Mill, the leaves of the plant are claimed to possess anticholinergic activity. [Kulkarni P. H and Shahida A., 2004] And hence, efforts have been taken to determine the anticancer activity. Therefore the present research work was conducted in order to identify antimutagenic activity of an aqueous extract of leaves of a plant species *Datura Metel* L and *Datura Innoxia* Mill.

MATERIALS AND METHODS

Collection, identification and authentication

The leaves of *Datura Metel* L and *Datura Innoxia* Mill were collected from Mayni region of Mahswad, Dist. Satara, Maharashtra, the collected leaves authenticated from the botanical laboratory, Balwant College, Vita, Sangli.

Plant extract preparation

Whole part of fresh plant material was taken and washed properly with distilled water, 5gm of leaves sample of both plants was cut into small pieces and ground properly in mortar and pestle, 10ml of distilled water was added to get fine paste and centrifuged for 30 min at 800 rpm. Supernatant was collected and used as a crude extract of plant material.

ANTIMUTAGENIC ACTIVITY

Antimutagenic Assay in Bengal gram seeds

Bengal gram seeds of good quality were taken and soaked with water to hasten. The germination process on next day, the seeds were distributed in a group of 10 each in petri dishes on moistened filter paper. Drug solutions were prepared in 1% DMSO at concentrations ranging from 1ml and added to the filter paper in the Petri dishes. One Petri dish served as DMSO control, and one served as Methotrexate (positive control) (Fiskesjo G., 1993) The seeds were allowed to germinate for 7 days and care was taken to moisten the filter paper with control and drug solution every 24 hours, the length of radicals measured in cm at the end of 7th day and % mean value of the DMSO (control) treated and % Growth inhibition calculated. (Kumar V. L and Singhal A., 2009).

Formula for % Growth inhibition:

$$\% \text{ growth of Inhibition} = \left(\frac{\text{Test}}{\text{Control}} \right) \times 100$$

Antimitotic Assay on Onion Root Tips

Antimitotic activity of *Datura Metel* L and *Datura Innoxia* Mill leaves extracts was carried out by using the method (Murthy *et al.*, 2011). Dried outer layer of healthy onion bulbs were removed and placed over a series of jars containing normal tap water, until to grow 3-4cm of roots from each bulb and tap water was changed at interval of 24hrs. After the root development, bulbs were considered as viable bulbs and water contents was removed using tissue paper and there bulbs were selected for the study. These roots were treated with aqueous extracts and whereas the positive control is treated with methotrexate. A blank with tap water was used as control. After 72hrs of treatment the root were taken out and total root length and number of roots per bulb were measure.

RESULTS AND DISCUSSION

Table 1: Antimitotic activity of datura species by using Bengal gram seed root length

| Groups of Sample | No. of Roots | Average Root of Length (In cm) | % Growth of Inhibition (In %) |
|---|--------------|--------------------------------|-------------------------------|
| Control (tap water) | 10 | 9.25 | — |
| Standard: Methotrxate (4mg/ml) | 2 | 1.5 | 16.21% |
| <i>Datura Metel</i> .L (Aq. Extract) | 10 | 5.45 | 58.91% |
| <i>Datura Innoxia</i> .Mill (Aq. Extract) | 10 | 7.37 | 79.67% |

Table 2 : Antimitotic activity of datura species by using Allium Cepa root length

| Groups of sample | No. of Roots | Average Root Length (In cm) |
|---|--------------|-----------------------------|
| Control (tap water) | 5 | 4.3 ± 0.25 |
| Standard: Methotrxate (4mg/ml) | 7 | 1.5 ± 0.13 |
| <i>Datura Metel</i> .L (Aq. Extract) | 3 | 1.8 ± 0.37 |
| <i>Datura Innoxia</i> .Mill (Aq. Extract) | 4 | 2.2 ± 0.45 |

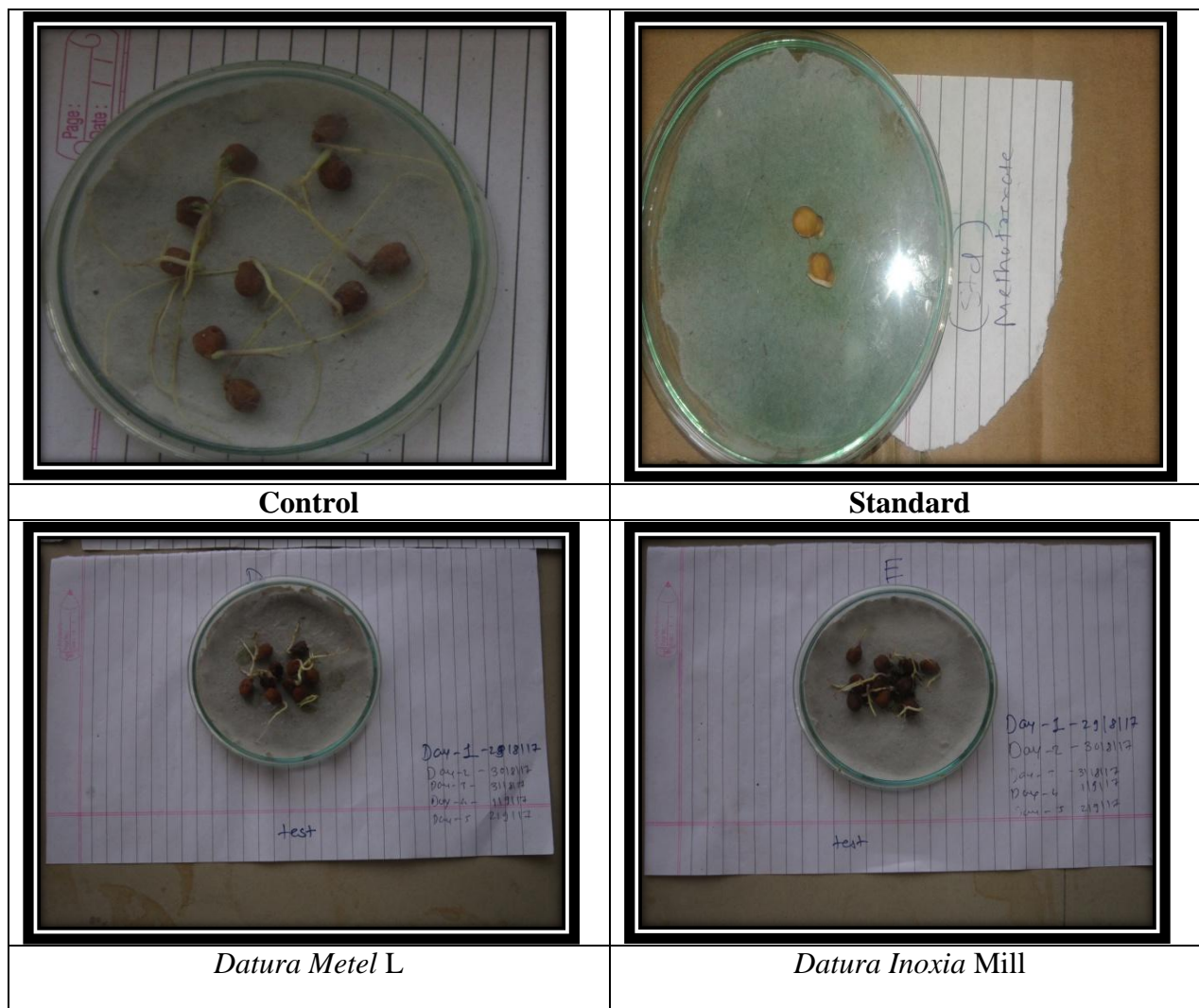


Fig 1: Antimitotic effect of *Datura Metel L* and *Datura Innoxia Mill* on 7th day on Bengal gram seed.

The result obtained is summarized (Table no.1).The average root length and % growth inhibition was lesser in that plant which is exposed to leaves extract than control groups. Out of two plant extract *Datura Metel L* was found highly effective in reduction of root length and % growth inhibition while *Datura Innoxia Mill* leaves extract shows average reduction of root length and % growth Inhibition i.e. both plant extract shows antimitotic activity but most effective leaves extract is *Datura Metel L* than *Datura Innoxia Mill*.

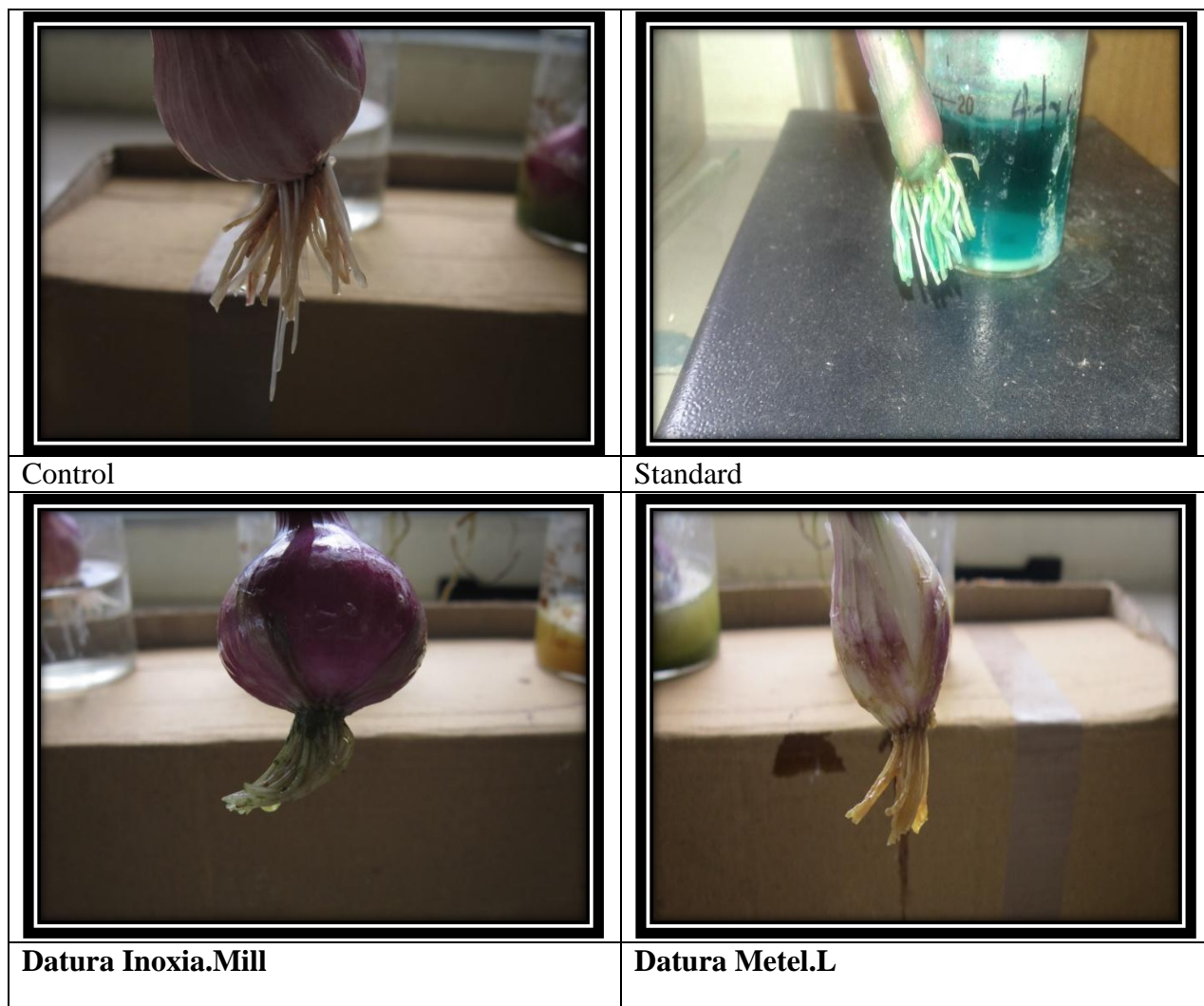


Fig. 2: antimitotic activity of *Datura Metel L* and *Datura Innoxia Mill* on *Allium cepa* root bulb

The results obtained are summarized (Table 2). It is observed that *Datura Metel L* and *Datura Innoxia Mill* leaves extract stunted the growth and development onion roots, in addition, the number of roots, average root length, and mitotic index were lesser in that plant which is exposed to leaves extracts than control groups. Out of two plant extract (aq. extract) *Datura Metal L* was found highly effective in reduction of root number, root length and mitotic index. While *Datura Innoxia Mill* shows average reduction of root length.

A wide variety of anti-cancer drugs exhibit effect by interfering with cell-cycle kinetics. These drugs are effective against cells that are proliferating and produce cytotoxic effect either by damaging the DNA during the S-phase of the cell cycle or by blocking the formation of the

mitotic index in M-phase. An alkylating agent, methotrexate interferes with DNA integrity and thereby exhibits strong antimitotic activity both in vivo in vitro.

CONCLUSION:

The preliminary antimitotic activity was preferred by using Bengal gram seed method and *Allium cepa* root tip assay method. The result reveals significant antimitotic activity in both the extract leaves. Thus, it can be concluded *Datura Metel* L and *Datura Innoxia* Mill leaves possess significant anti-mitotic activity. In future it will be interesting not only to isolate the active chemical constituent but also to determine the mechanism of action of the same by using different screening models.

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