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### A Novel Solvent System for Profiling Poisonous Plant Extracts Using Thin Layer Chromatography

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#### ABSTRACT

Poisonous plants may be a threat to the health and safety of people and animals. It makes crucial to have knowledge about surrounding poisonous plants. Information gathered by generating database of poisonous materials from any particular region may be life saving. Chemical analysis of these plants is another important aspect especially for forensic experts solving crime cases involving poisonous plants. Therefore this paper has also conducted Thin Layer Chromatographic separation of poisonous plants. A wide diversity of plants could be seen in and around Rohtak city of Haryana but literature survey didn't reveal any significant information about the poisonous plants from this area. Therefore, the present study has inspected occurrence of some poisonous plants throughout Rohtak city and their chromatographic analysis. Importantly the results have been of great utility. Morphological examination identified ten poisonous plants *vis. Thevetia peruviana, Nerium odoratum, Calotropis procera, Ricinus communis, Datura fastosa, Argemone mexicana, Ipomea marginate, Crinum asiaticum, Plumeria obtuse* and *Abrus precatorius* from different localities of the selected area. A new single solvent system chromatographically separating all these poisonous plant extracts has also been developed.

**Keywords:** Poisonous plants, Thin Layer Chromatography, Forensic science.

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## INTRODUCTION

History advocates that plants accounted for over 90% of all poisonings in the nineteenth century and earlier. They are still involved in many modern poisonings but with lesser impact. Many animals, especially grazing farm animals, are killed when feeding on certain plants. Plant poisonings are found most commonly in children. Sometimes they occur in adults who mistake poisonous plants for edible ones<sup>1</sup>. Around 700 poisonous plants species have been reported from India<sup>2</sup>. Variety of plant diversity exists in state Haryana due to favorable climatic and geographical conditions. In a study made in 2013, a total of 282 plant species belonging to the 76 families were recorded from Jind district of Haryana<sup>3</sup>. In the same year, 277 plant species belonging to the 72 families were also recorded from Karnal district of Haryana<sup>4</sup>. In many countries where plant poisons are commonly available, people use them as a means to commit assault, homicide, or suicide. In India, seeds of *Datura fastuosa* are commonly used to stagger people in facilitating robbery or assault. Seeds of *Abrus precatorius* have been used for homicidal purposes. Children are often involved in accidental cases. Swallowing of *Croton tiglium* seeds by mistake can produce fatal results<sup>5</sup>. In a major forensic contribution the plant poisons were forensically analysed using various chemical and instrumental methods of analysis<sup>6</sup>. Literature has also revealed use of Thin Layer Chromatography (TLC) for the separation of seeds and other parts of the poisonous plant extracts<sup>5,7</sup>. Present attempt was undertaken in order to contribute a new and single TLC solvent system to separate extracts of different types of poisonous plants. The separated constituents may further be identified using other confirmatory techniques by the other scientific communities for their wide applications.

## MATERIALS AND METHOD

### **Study area and sample collection:**

Wide areas in and around Rohtak city were surveyed in the month of February-March 2015. Photograph of these plants were grabbed at the time of collection. These plants were identified studying their morphological characteristics based on the available literature<sup>8,9</sup>. Important parts of these poisonous plants were also collected at the spot.

### **TLC analysis:**

All collected sample of poisonous plants were washed individually in distilled water and left as such at room temperature for drying. These plants were macerated in powdered form. Extract of different parts of these plants were made in a solvents mixture comprising of petroleum ether, methanol and acetone in ratio (3:4:3). Using fine capillary tubes these plant parts extracts were

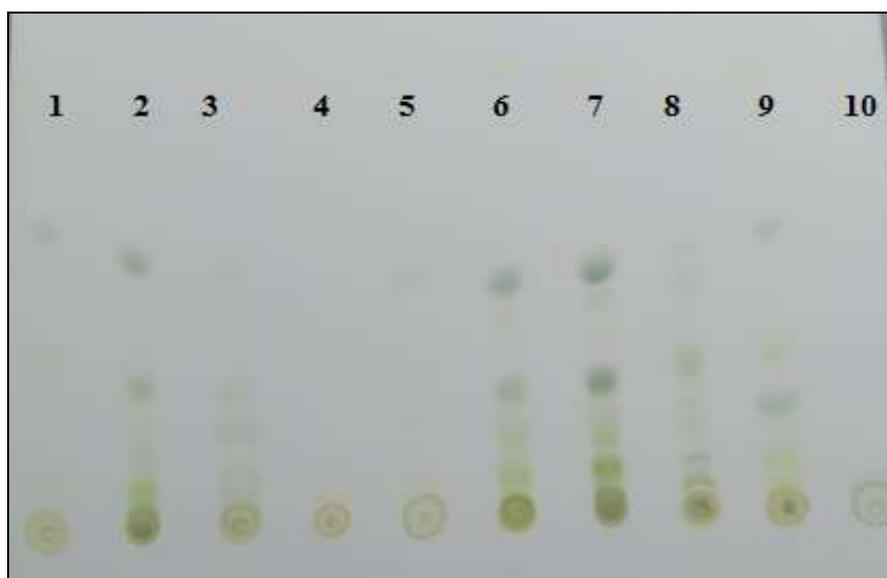
spotted on pre-coated TLC silica gel 60 F254 aluminum sheet (20x20cm) of make Merck, Germany. Different solvent systems were run to develop these plates. Observations were taken in sunlight, in UV light cabinet (Short wavelength and long wavelength) and in iodine fuming method. The hRf values of spots for each sample were noted using template. During final experimentation the noted room temperature was 38°C and solvent run completed in 55 minutes.

## RESULTS AND DISCUSSION

Morphological examination of the present field survey identified ten poisonous plants *i.e.* *Thevetia peruviana*, *Nerium odoratum*, *Calotropis procera*, *Ricinus communis*, *Datura fastosa*, *Argemone mexicana*, *Ipomea marginate*, *Crinum asiaticum*, *Plumeria obtuse* and *Abrus precatorius* in different localities of study area. It was observed that most of the poisonous plants were available in the spacious campus of Maharshi Dayanand University, Rohtak.

### TLC analysis:

Solvent systems available in the literature were used for the chromatographic separation of poisonous plant extracts but results were not satisfactory<sup>5,7</sup>. Lastly, a new solvent system containing petroleum ether and acetone in ration 8:2 was used to run the plate. It was observed that all the extracts have shown separation on the TLC plate using this solvent system. It was also noticed that fewer spots were visible in day light but maximum spots could be seen in iodine fumes (Figure-1 & 2).



**Figure-1: Results in day light**

There was a wide range of hRf values observed both in day light and iodine fumes (Table-1). Till date no single solvent system has been reported in the literature which can be used for the TLC separation of different poisonous plant extracts. Already published work has reported use of single

solvent system for the poisonous seeds extracts only<sup>5</sup>. This study has included seeds and other plant part extracts. Other reported solvents systems were also tried for this analysis<sup>7</sup>. None of these could produce chromatographic separations of all plant extracts simultaneously.

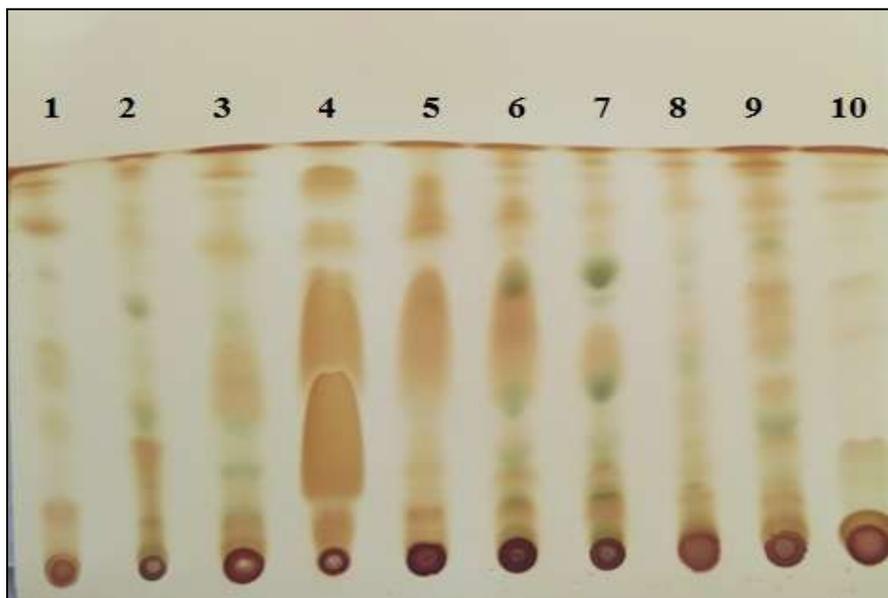


Figure-2: Results in Iodine fumes

Table 1: Showing hRf values in day light and iodine fumes

S.No.	Plant name	Part used for extract	Day light visible spots		Iodine visible spots	
			Spot Number	hRf vale	Spot Number	hRf vale
1	<i>Thevetia peruviana</i>	Fruit	1	66	8	9,14,29,37,41,46,66,83
2	<i>Nerium odoratum</i>	Leaves	3	25,31,59	8	7,16,25,31,37,59,80,89
3	<i>Calotropis procera</i>	Flower	2	19,28	7	9,19,28,36,54,78,93
4	<i>Ricinus communis</i>	Seed	0	-	5	25,52,66,76,93
5	<i>Datura fastusa</i>	Seed	3	19,40,54	5	19,40,54,69,74
6	<i>Argemone mexicana</i>	Leaves	4	9,15,28,52	8	7,9,15,19,28,52,68,73
7	<i>Ipomea marginate</i>	Leaves	4	9,15,28,53	10	7,9,15,19,28,36,47,53,70,76
8	<i>Crinum asiaticum</i>	Leaves	3	9,23,58	8	11,18,23,32,34,49,58,81
9	<i>Plumeria obtusa</i>	Leaves	4	11,23,29,63	10	11,23,29,34,42,49,63,71,83,94
10	<i>Abrus precatorius</i>	Seeds	0	-	6	14,52,56,68,8,86

## CONCLUSION

Database of poisonous plants generated after field survey may also be a piece of information for the local Poison Information Centre. Results of this study may also be helpful for the researchers and academicians from forensic veterinary toxicology, botany and ecology etc. After conducting extensive and strategic chromatographic separating experimentation a new and single solvent system has been developed. This solvent system would definitely help the researchers dealing with

the phytochemical analysis of poisonous plant extracts either from the fields of pharmacological toxicology or forensic toxicology.

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