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PHYTOTOXIC EFFECT OF *CLUSIA ROSEA JACQ.* ON METABOLISM OF *TRIDAX PROCUMBENS L.*

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ABSTRACT : The present research work deals with toxic effect of the powdered leaf residue of *Clusia rosea Jacq.* adversely affected to the growth and metabolism of *Tridax procumbens L.*The leaf extract of *Clusia rosea Jacq.* greatly influenced the growth parameter after 15 and 30 days of sowing. Meanwhile biochemical constituents such as total chlorophylls, polyphenols, carbohydrates and protein contents were reduced in leaves of *Tridax procumbens L. a*fter application of leaf residue 15^{Th},30^{Th} and 45^{Th} days after sowing, Bio-constituents were greatly reduced as compared to control. Hence, these allelochemicals may be inhibit growth and metabolism of *Tridax procumbens L.* may be considered as eco-friendly plant herbicide.

Key words:- *Clusia rosea Jacq., Tridax procumbens L.*, chlorophylls, polyphenols, carbohydrates and protein.

I] INTRODUCTION

Tridax procumbens L. a native to the Tropical Americas, and small annual herbaceous weed shows world wide distribution commonly known as Coat buttons. In India it known as Bisalyakarmi, Mukkuthipoo and belong in to the family: Asteraceae .*Tridax procumbens L.* as a weed of 31 crops, was recorded wide range of crops such as cereals, fibres, legumes, pastures, tree crops and vegetable though not associated with water logged soil, it occurs in irrigated crops (Holm et al. 1997), and it is as a competitor with crops has its most serious impact on agriculture lands. In India, it can interfere with the harvesting of jute (Holm et al., 1997). Das and Pal (1970) shows that it has an allelopathic effect on rice. *Tridax procumbens L.* was listed in regulation as federal noxious weed in 1983, based on the recommendation of the technical committee to evaluate noxious weed (TCENW). It is a fast growing weed, spreads due to large of achenes can carry to a longer distance with much impact on agriculture ecosystem. Presently use of herbicides creats hazards in agri ecosystem and live-stock. Hence an alternative eco friendly management can improve agricultural produce, hence an attempt was made to search plant based herbicides.

Clusia rosea Jacq. is an ornamental tree native to the caribbean, including Bahamas, Hispaniola, Cuba, Rici and Florida it belongs to the family : Clusiaceae. It commonly known as autograph tree, Balsam Fig, Pitch apple and Copey. The genus *Clusia* comprises of about 145 species mostly from subtropical and tropical regions of the new world. In India, the plant was previously cultivated as an ornamental but it mostly spread by bird now, becoming naturalized in distrurbed areas.

The plant contains latex and its floral resin have antiseptic properties, hence it is used to seal wounds, it is a powerful air purifier, and absorbs carbon dioxide at night. Even dry latex is used sometimes like incense by burning in churches. Decoctions of bark and fruit rind used to relief pain in rhematic patients, it also used to get relif in from toothache and calluses on the feet. The leaf or flower decoction is used internally on a pectoral to relieve chest complaints. The gum has dangerous and purgative properties, it is used as disinfectant by burning the gum and is also used for caulting boats. The plant has much importance in the welfare of the society.

As the plant shows several pharmacological properties, it contains lots of phytochemicals such as clusianone, polyisoprenylated benzophenones, Henry et al.(1999) plukenetione E acetate, nemorosone-4 in keto and enol equilibrium, guttiferone E, guttiferone F, 30-epi-Cambogin and isoxanthochymol, Osmany C. Rubio et al.,(2001) along with large number of hydrocarbons. Hence, plant possess huge amount of hydrocarbons, alkaloids, and several phytochemical. Therefore, as attempt was made to study the residual effect of true phytochemicals on growth and metabolism of *Tridax procumbens L.* to recognize its suitability as a eco-friendly herbal herbicide.

II] MATERIAL AND METHODS

Fresh Leaves of *Clusia rosea Jacq.* were harvested from Botanical Garden Shivaji university, Kolhapur during Nov-Dec 2022 for experimental study. The collected sample were brought to the laboratory, washed with tap water followed by distilled water. The leaves were cut into small pieces, and sun dried for 2 consecutive days and further kept in electric oven at 60°C for 2 days. The dried samples of leaves were finely powdered in domestic grinder into fine powder. The pot studies were carried out during Dec 2022 to Feb 2023, in the garden of Department of Agro chemical and pest management, Shivaji University. Kolhapur.

Thin black coloured polyethylene bags with 10 kg capacity were filled with 5 kg of fine Loam soil. The leaf samples with 20g, 40g, 60g and 100g (2%, 4%, 6% and 10%) dried powder was boiled in 500 ml of distilled water in each beaker, after cooling, the different leaf extract was mixed with 5 kg of fine Loam soil, and filled in each polyethylene bags with of respect to above different concentration separately. In each polyethylene bag five viable seeds of *Tridax procumbens L.* were sown in equal distance. One polyethylene bag considered as control, without any residue of *Clusia rosea Jacq.* uniform watering was carried out 100 ml in each bag, continuously up to 30 days (Days after sowing), After fifteen and one month growth parameter and biochemical analysis was carried out.

The treated residue of *Clusia rosea Jacq.* on *Tridax procumbens L.* was carried out in randomized block design of four replicates.The parameter of growth such as number of leaves, plant height etc. were measured on 15^{th} and 30^{th} day after sowing. The percentage of reduction was calculated in all leaf residue. The biochemical constituents were estimated after 15^{th}, 30^{th} and 45^{th} day of sowing. The total chlorophylls was calculated by the method of Arnon (1949) method the polyphenol content were estimated by the method of Folin and Denis (1915), the carbohydrate content was measured by anthrone method prescribed by Hodage and Hofreiter (1962) and Thayumanavan and Sadasivan (1984) and protein content was estimated by the method of Lower'y et al. (1951).

III] RESULT AND DISCUSSION.

Adverse effect of leaf residue of *Clusia rosea Jacq.* on growth parameter was to depicted in Table 1 & 2. The production of leaves *Tridax procumbens L.*was hindered due to effect of leaf residues of *Clusia rosea Jacq.*, after 15 days of sowing. At 10 percent concentration of leaf residue, the production of leaves was restricted to 50 percent, followed by 90 percent at 4 percent concentration, as compared to control (100%). A parallel findings was documented by Nagaraja (2013) due to residue of *Asclepias curasavica Linn.* and S. Hodage et al. (2023) in *Ficus elastica Roxb.* Similarly 91.66 percent get reduced after 30 days of sowing at 4 percent concentration followed by 75 percent decrease at 6 percent concentration. Simultenously the height of *Tridax procumbens L.* was greatly minimized, and reduction of 71.42 percent was noticed after 15 days of sowing and 75 percent at 30 days of sowing with 10 percent concentration of leaf residue of *Clusia rosea Jacq.*(Table-1). This suggest that hinderance of growth may be due to phytotoxic effect of leaf residue on *Tridax procumbens L.*as compared to control (100%).

The presence of phytochemical or allelochemicals may affect the physiology and metabolism process, as result height of the plant and production of leaves was inhibited (Table-1). In *Tridax procumbens L.*

The leaf residue of *Clusia rosea Jacq.* (biomass), significantly altered the phytochemicals of *Tridax procumbens L.* The total chlorophylls get denounced in all different concentration of leaf residues, 104.86 mg of chlorophyll content get reduced to 104.12 mg per gram of fresh tissue, resulting 1 percent decrease as compared to control. A concurrent finding was reported by Nagaraja and Deshmukh (2009) in residues of *Andrographis paniculata.* The biochemical polyphenols has much importance in resistance has been extensively worked out by Deshpande(1993), get reduced in all different concentration of the leaf residue (Table-2). after 15 days of sowing. 5.26 mg of polyphenol get declined to 3.42 mg per gram of fresh tissue at 10 percent Concentration.

The protein content also get curtailed in all concentration of leaf residues of *Clusia rosea Jacq.* (Table-2). 110.26 mg of protein get declined to 92.96 mg per gram of fresh tissue, after 30 days of sowing. A similar elucidation was recorded by Nagaraja and Pudale (2013) in *Asclepias curasavica Linn.* residue. This may be proteins are consumed as respiratory substrate, when carbohydrate supply was inadequate or may be due to effect of phytochemical or allelochemicals. The Carbohydrate content significantly decreased in all concentrations of leaf residue of *Clusia rosea Jacq.* (Table-2) after 45 days of sowing. 26mg of total sugars get diminished to 11.1 mg per gram of fresh tissue, with reduction of 42 percent. This indicates allelochemicals may interference with photosynthesis, in relation to water(Colton and Einhelling, 1980) and nutrient uptake (Craig and Einhelling, 1986). A similar findings was reported by Nagaraja and Pudale (2013) in *Asclepias curasavica Linn* residue and S. Hodage et al.,(2023) in residues of *Ficus elastica Roxb.*

Thus in all different concentration of Leaf residue of *Clusia rosea Jacq.* influence the growth and metabolism of *Tridax procumbens L.* Hence, it can be used as eco-friendly botanical herbicide for management of weeds in Agriculture.

IV] ACKNOWLEDGEMENT

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V] TABLES AND GRAPHS

Table -1 Phytotoxic effect of *Clusia rosea Jacq.* on a growth and development of *Tridax procumbens L.* after 15 days of sowing.

		Leaves Residue			
Sr. No.	Treatment by residue	Production of leaves per plant after 15 days	Percentage (%) of reduction	Plant height after 15 days (cm)	Percentage (%) of reduction
1.	Control	10	-	2.8	-
2.	2 %	10	-	2.6	92.85
3.	4 %	09	90	2.6	92.85
4.	6 %	07	70	2.2	78.57
5.	10 %	05	50	2.0	71.42

Table -1 Phytotoxic effect of *Clusia rosea Jacq.* on a growth and development of *Tridax procumbens L.* after 30 days of sowing.

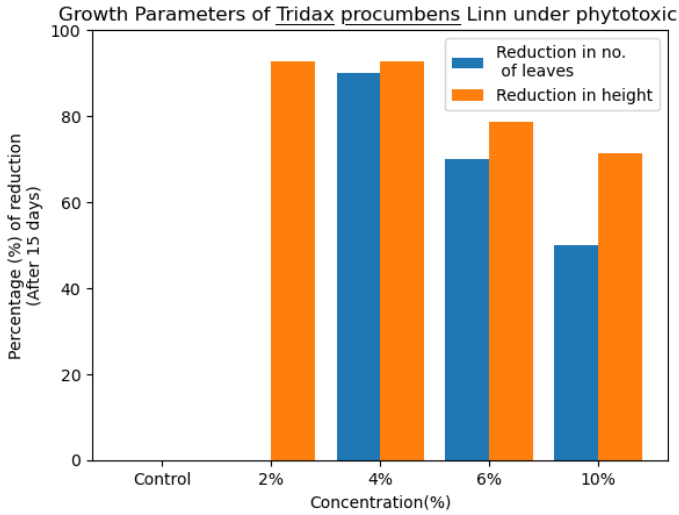
		Leaves Residue			
Sr. No.	Treatment by residue	Production of leaves per plant after 30 days	Percentage (%) of reduction	Plant height after 30 days (cm)	Percentage (%) of reduction
1.	Control	12	-	3.2	-
2.	2 %	10	83.33	2.8	87.50
3.	4 %	11	91.66	2.9	90.60
4.	6 %	09	75	2.5	78.12
5.	10 %	10	83.33	2.4	75

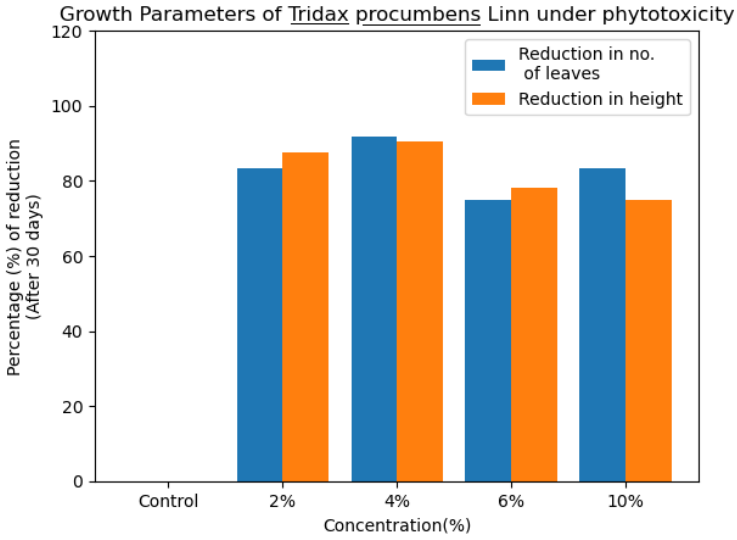
Table- 2 Biochemical constituents

Effect of residues of leaves of *Clusia rosea Jacq.*on *Tridax procumbens L.*

Sr.No.	Constituents	Control	Leaves residue			
			2 %	4 %	6 %	10 %
1.	Chlorophyll a*	27.34	35.60	25.32	32.05	21.15
2.	Chlorophyll b*	77.56	110.60	94.73	37.48	83.67
3.	Total* Chlorophyll (a+b) (After 15 days)	104.86	146.20	120.05	69.53	104.12
4.	Polyphenol* (After 15 days)	5.26	4.60	5.26	4.21	3.42
5.	Protein* (After 30 days)	110.26	108.10	107.02	100.54	92.96
6.	Carbohydrade* (After 45 days)	26.0	20.1	21.1	16.4	11.1

* Expressed as mg^{-1} g^{-1} of fresh tissue


Growth Parameters of Tridax procumbens Linn under phytotoxicity
Reduction in no. of leaves
Reduction in height
Percentage (%) of reduction (After 15 days)
Control
2%
4%
6%
10%
Concentration(%)


Growth Parameters of Tridax procumbens Linn under phytotoxicity
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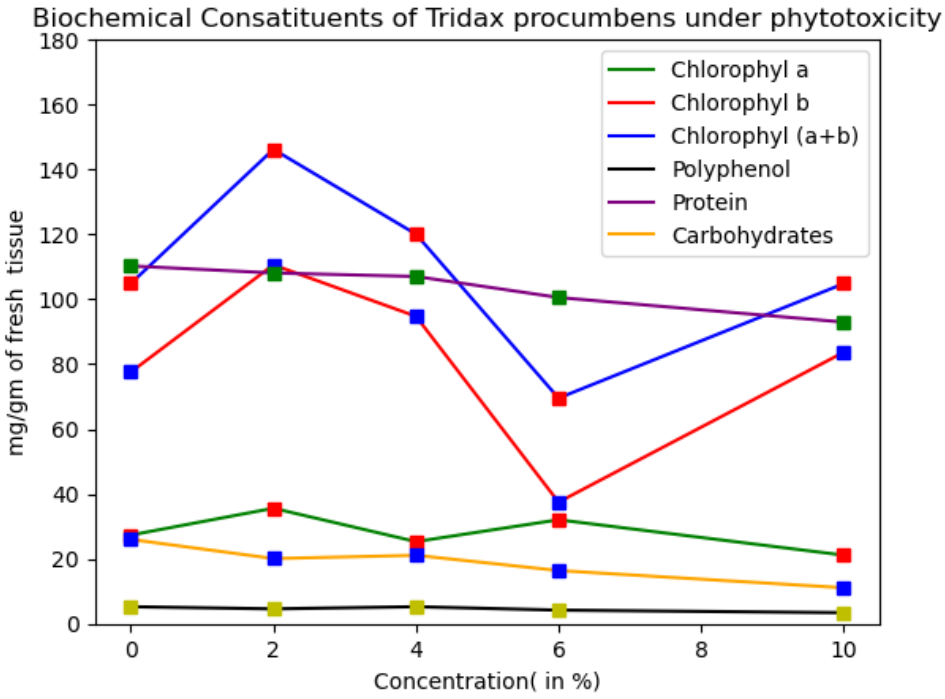
Reduction in height
Percentage (%) of reduction (After 30 days)
Control
2%
4%
6%
10%
Concentration(%)


Biochemical Consatituents of Tridax procumbens under phytotoxicity
Chlorophyl a
Chlorophyl b
Chlorophyl (a+b)
Polyphenol
Protein
Carbohydrates
mg/gm of fresh tissue
Concentration(in %)

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