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Phytotoxic Effect of Elaeagnus Latifolia (L) On Growth and Metabolism of Synedrella Nodiflora (L)

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ABSTRACT:
The present investigation deals with impact of powdered leaf and stem residue of *Elaeagnus latifolia L* on weed *Synedrella nodiflora L*, which adversely affected the growth and metabolism. The residues of leaf and stem greatly influenced the growth parameter including production of leaves and branches after 15 and 30 days of sowing. Meanwhile the biochemical constituents such as total Chlorophylls, polyphenol content, protein and carbohydrate levels were greatly comprehensively reduced in leaves and stem of *Synedrella nodiflora L* after 15^{th},30^{th} and 45^{th} days after sowing, as compared to control. Therefore, these allelochemicals may retard growth and metabolism of *Synedrella nodiflora L* hence residues may be considered as bio-herbicide or eco-friendly herbicide.

Keywords: Elaeagnus latifolia L, Synedrella nodiflora L, Chlorophylls, Polyphenols, Proteins and Carbohydrates.

I] INTRODUCTION

Synedrella nodiflora L. a annual herbaceous tender ephemeral weed found native of tropical America, now it is widely distributed nearly 50 countries in many crop fields, as well as pastures, road sides, waste ground, nurseries, gardens and lawns. It is found to be a contaminant in legume field (Tasrif, et al 1991), causes problem to pulse crops. As the weed belongs to Family:Asterace, produces enormous amount of seeds, they germinate quickly and reproduce, several times in each year and it is a competitor with crops and has its most and impact on Indian agricultural lands. The weed shows the presence of flavonoids, alkaloids, glycosides, tannins, phytosterols, steroids, and saponins (Hossain. S. et al. 2012) the dry matter, crude fibre, ash content, neutral detergent fibre, crude protein, and detergent fibre and acid detergent lignin were reported by Bindelle et al. (2007). Hence, the plant possess anticonvulsant (Amoateng et al.2012), Sedative (Woode E. et al. 2011) antioxidant (Amoateng et al. 2011) and antinociceptive properties (Woode et al., 2009) creates problem to live-stock and crops in agriculture, at present use of herbicides increases hazards on agri ecosystem therefore alternative eco-

friendly plant herbicide provides smoother management of weeds. Hence an attempt was made to search plant based herbicide, using plant *Elaeagnus latifolia L*.

Elaeagnus latifolia L, spreading evergreen tall shrub growing warm temperate zone and on sub-tropical region belongs to family: Elaeagnaceae . The plant is rich with vitamin A, C and E and with good source of fatty acids, comprises five species which are distributed in Asia, China, Shrilanka and Vietnam. Naturally in India, plants are growing in western Ghats of Maharashtra as well as cultivated in the gardens as a hedge plant.

In India, fruits of trees plant are harvested from local areas used food as well as medicine. In addition to that it acts as an excellent companion in orchids as it increase yield, having a relationship with soil bacteria as a result it can fix atmospheric nitrogen supply to orchids, as a symbiotic association. The plant parts are used in the treatment of cancer or reversing the growth of cancer and different diseases of man (Grabley and Thiericke, 1999). The plant shows anti mutagenic antimicrobial and antioxidant activity (Okmen and Turkean 2014).

Elaeagnus latifolia L contains enormous number of phytochemicals, such as cardiac glycosides, flavonoids, terpenoids, sitosterols (Burges 2008, Beigon Taberi et al, 2010). The flavonoids such as Catechin, epicatechin, quercetin, luteolin Kaempferol, epigallocatechin, gallocatechin, galactopyranoside, isorhamnetic, etc (Si, et al. 2009, Wang and Wei 2010) Mean while plant possesses polyphenolic compounds like flavonols, isoflavone, flavone, flavanone proanthocyanidin and anthocyanin, etc, because of presence abundant and innumerable phytochemicals hence an attempt was made to study its phytotoxicity or allelochemicals in growth and metabolism of *Synedrella nodiflora L* weed.

II] MATERIAL AND METHODS

Fresh leaves and stem of *Elaeagnus latifolia L* were collected from Botanical garden, Department of Botany, Shivaji University, Kolhapur during Nov-Dec 2022, brought to the laboratory, washed it with tap water initially followed by distilled water. The sample material was cut into small pieces, and sundried for two consecutive days, later kept in Electric oven for 2 days at 60°C. The dried samples were crushed into fine powder using domestic grinder. The pot studies were carried out in garden of Department of Agrochemicals and Pest Management, Shivaji University, Kolhapur during Dec 2022 to Feb 2023.

Black coloured thin polyethylene bags of 10 kg capacity were used for experiment, in that 5 kg of loam soil mixed with leaf and stem extract of *Elaeagnus latifolia L* of 20g, 40g, 60g and 100g (2%, 4%, 6%, and 10%) concentration respectively. The leaf and stem extract were prepared by boiling 500 ml distilled water with different weights of (20g, 40g, 60g and 100g) powder of leaves and stem. In each polyethylene bag five viable seeds of *Synedrella nodiflora L* were sown in equal distance. One polyethylene bag considered as control, without any residue of *Elaeagnus latifolia L* uniform watering was carried out in all bags of 100 ml water, continuously up to 30 days (Days after sowing DAS). After fortnight and one month growth parameter and biochemical analysis was carried out.

The stem and leaf residue of *Elaeagnus latifolia L* in which *Synedrella nodiflora L* were grown in randomized block design of four replicates. The growth parameters of such as height, number of leaves were measured after 15 day and 30 days of sowing. The percentage of reduction was calculated in all residues. The biochemical analysis was carried out after 15^{th}, 30^{th} and 45^{th} day of sowing. The total chlorophyll content was measured by the method of Arnon (1949), the total polyphenol content was

estimated by method of Folin and Denis (1915), the protein content was evaluated by the method of Lowry's et al. (1951) and carbohydrate content was calculated by the method prescribed by Hodage and Hofreiter (1962) and Thayumanavan and Sadasivan (1984).

III] RESULT AND DISCUSSION

The Impact of residues of leaf and stem of *Elaeagnus latifolia L* on *Synedrella nodiflora L* has been depicted in Table 1,2 and 3. The production leaves get hampered in all concentration, as compared to control. There is 75 percent reduction was recorded in 4%, 6% and 6% concentration after 15 and 30 days of sowing, simultaneously growth(height) of *Synedrella nodiflora L* was reduced to 60 percent to 10% concentrations after 15 days of sowing and 32.69% after 30 days of sowing compared to control (100%). This may indicate after effect of allelochemicals penetrate the soil, and modified the growth related biochemical. A parallel report was documented by Nagaraja (2013) due to residue of *Asclepias curasavica L* and Hodage et al. (2023) in *Ficus elastica L.*

The presence of allelochemicals, which are non-nutritional primary and secondary metabolite (Weir, et al,2004, and Iqbal et al. 2012). are synthesized during Shikimate pathway,(Hussian and Reigosa, 2011) or in the case of essential oils from the soprenoid pathway, may affect metabolism as well as physiology of *Synedrella nodiflora L* on result height and number of production of leaves get inhibited (Table 1 & 2), due to release of phytochemicals by *Elaeagnus latifolia L.*

A supplement findings of its phytochemicals provides a clue, as the total chlorophyll content in the leaves get minimized in all concentrations 174.49 mg of chlorophyll get reduced to 164.92 mg per gram of fresh tissue at 10 percent concentration, (Table 3), after 10 days of sowing. A coincidental report was documented by Nagaraja and Deshmukh (2009) in residues of *Andrographis paniculata*. The phytochemical polyphenol content, get diminished (Table 3), 4.21 mg of polyphenol or minimized to 3.15 mg per gram of fresh tissue, decreased to the extent of 74 percent in the leaves, while 87 percent decreased in the stem tissues of *Synedrella nodiflora L* (Table 3). A parallel finding was reported by Nitin et al. (2023). The protein content also it curtailed in all concentrations (Table 3) 280mg of protein get dropped to 163.24 mg per gram of healthy tissue of *Synedrella nodiflora L* after 30 days of sowing, reduced to extent of 58 percent in leaves after 64 percent in stem. A Similar elucidation was recorded by Nagaraja and Pudale (2013) in *Asclepias curasavica Linn*. probably when carbohydrate supply was inadequate, proteins are consumed as respiratory substrate, this happened due to effect of allelochemicals or phytochemicals. The carbohydrate content significantly denounced in leaves and stem of *Synedrella nodiflora L* (Table. 3), 18.4 mg of total carbohydrate get decreased to 9.8 mg of carbohydrate per gram of fresh tissue, lessen to the extent of 53 percent in leaves and 34 percent in stem of *Synedrella nodiflora L*,. The diminished. amount of carbohydrate, may be due to interference of allelochemicals in process of photosynthesis, as well as in relation to water (Colton and Einnelling,1980) as well as nutrient uptake (Craig and Einhelling, 1986). A concurrent report was documented by Nagaraja and Pudale (2013) and Nitin et al. (2023).

The different concentration of leaf and stem residues of *Elaeagnus latifolia L* influence, the growth and physiology of *Synedrella nodiflora L* the mode of action of allelochemicals is similar to herbicide, these features, may be considered for possible use in weed management as bio herbicide.

IV] ACKNOWLEDGEMENT

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V] TABLES

Table -1 Phytotoxic effect of *Elaeagnus latifolia L on* a growth and development of *Synedrella odiflora L* after 15 days of sowing.

		Leaves Residue				Stem 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	Production of leaves per plant after 15 days	Percentage (%) of reduction	Plant height after 15 days (cm)	Percentage (%) of reduction
1.	Control	04	-	1.5	-	04	-	1.5	-
2.	2 %	04	-	1.3	86.6	04	-	1.42	94.6
3.	4 %	03	75	1.3	86.5	03	75	1.12	74.6
4.	6 %	03	75	1.2	80.0	03	75	1.40	93.3
5.	10 %	03	75	0.9	60.0	03	75	1.35	90.0

Table -2 Phytotoxic effect of *Elaeagnus latifolia L* on a growth and development of S*ynedrell*a *odiflora L* after 30 days of sowing.

		Leaves residue				Stem 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	Production of leaves per plant after 30 days	Percentage (%) of reduction	Plant height after 30 days (cm)	Percentage (%) of reduction
1.	Control	04	-	5.2	-	04	-	5.2	-
2.	2 %	04	-	2.2	42.3	04	-	5.0	96.15
3.	4 %	03	75	1.9	36.53	04	-	4.0	76.92
4.	6 %	03	75	1.9	36.53	04	-	4.0	76.92

5.	10 %	03	75	1.7	32.69	03	75	3	57.69

Table- 3 Biochemical constituents

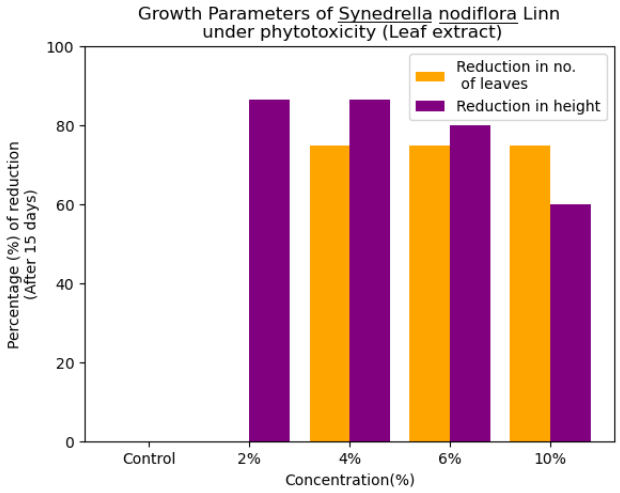
Effect of residues of leaves and stem of *Elaeagnus latifolia L on Synedrella nodiflora L.*

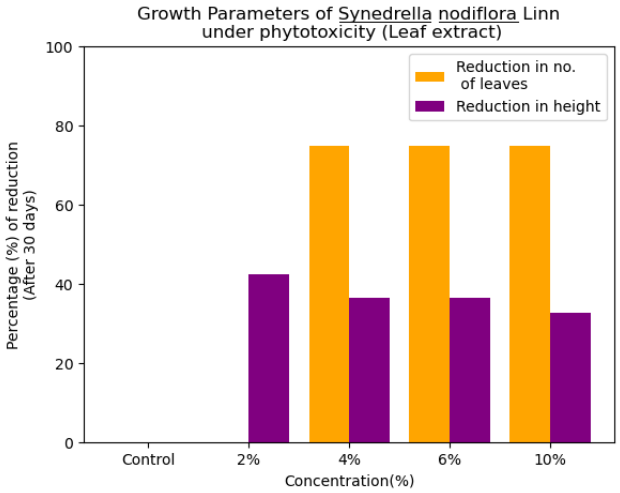
Sr.No.	Constituents	Control	Leaves residue				Stem residue			
			2 %	4 %	6 %	10 %	2 %	4 %	6 %	10 %
1.	Chlorophyll a*	38.32	26.82	45.21	25.24	29.65	37.51	26.56	33.72	23.04
2.	Chlorophyll b*	139.07	133.48	127.40	149.58	135.16	129.13	125.83	145.88	134.06
3.	Total* Chlorophyll (a+b) (After 15 days)	177.49	160.38	172.96	175.03	164.92	166.75	152.5	179.7	157.2
4.	Polyphenol* (After 15 days)	4.21	4.21	3.68	2.63	3.15	4.73	4.11	4.21	3.68
5.	Protein* (After 30 days)	280	195.66	176.20	148.64	163.24	265.43	230.25	250.23	180.47
6.	Carbohydrate * (After 45 days)	18.4	12.2	9.2	12.2	9.8	12.8	9.3	9.88	6.29

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

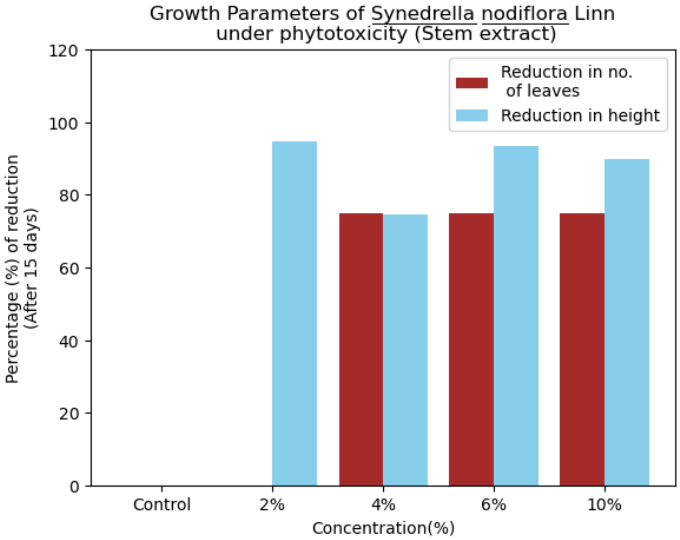
VI]GRAPH

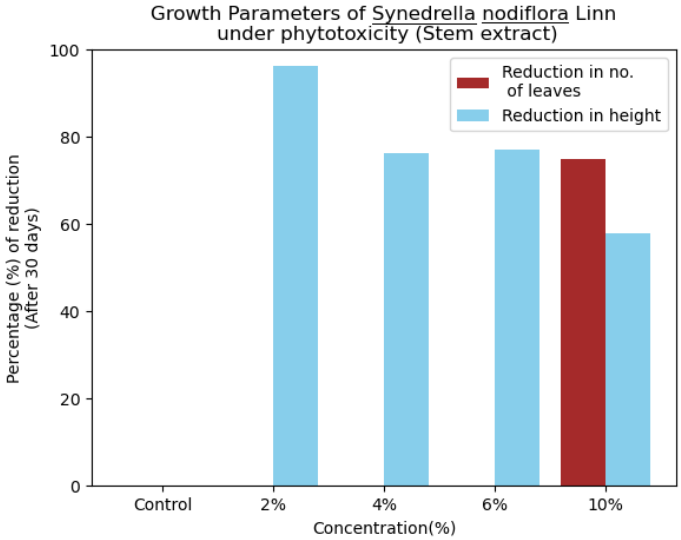
Phytotoxic effect of *Elaeagnus latifolia L* leaf residue on a growth and development of *Synedrella nodiflora L* after $15^{th}$and 30^{th} days of sowing.

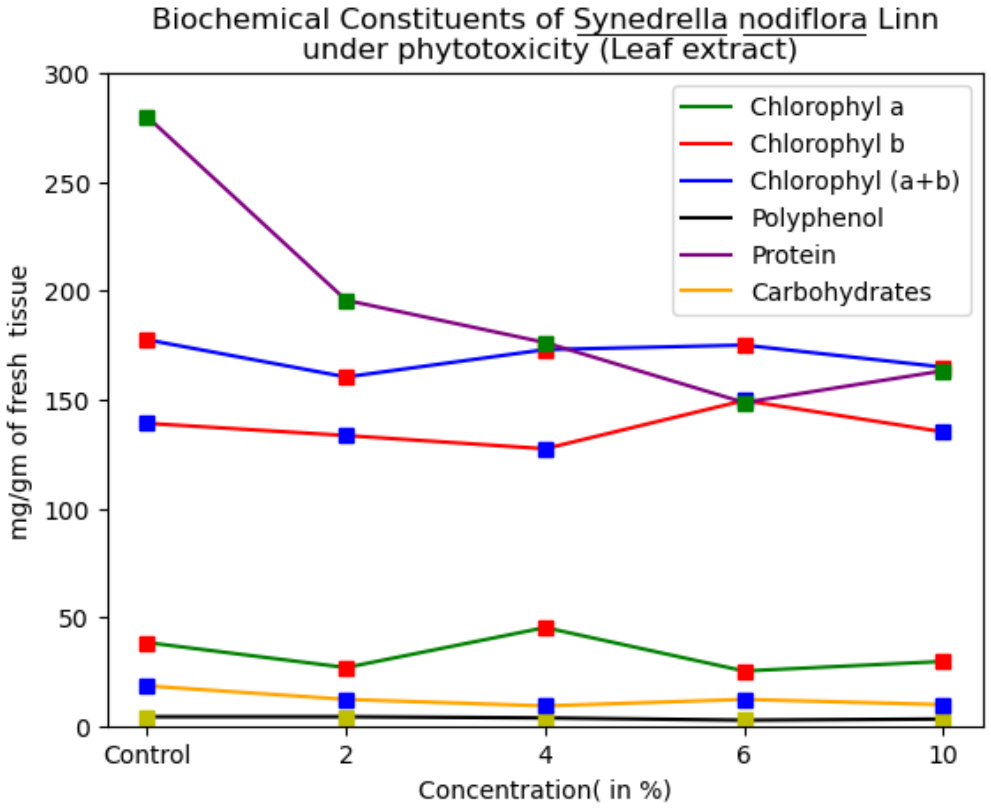


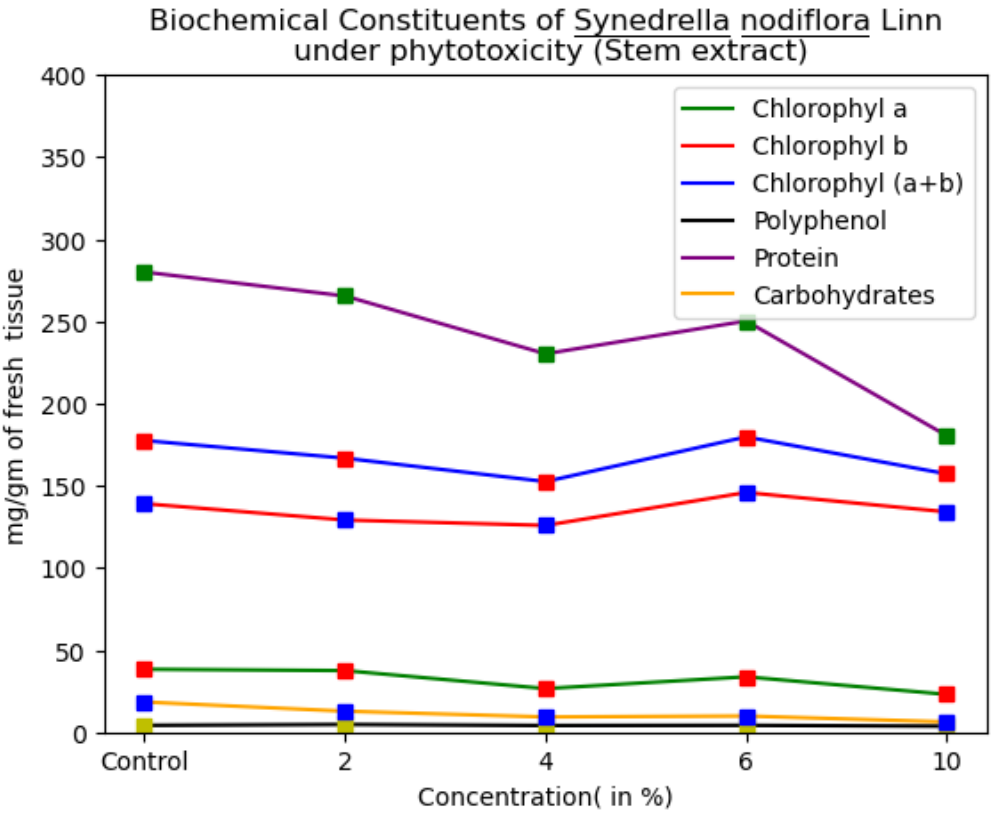


Phytotoxic effect of *Elaeagnus latifolia L* Stem residue on a growth and development of *Synedrella nodiflora L* after 15thand 30th days of sowing.






Biochemical Constituents of Synedrella nodiflora Linn
under phytotoxicity (Leaf extract)
Chlorophyl a
Chlorophyl b
Chlorophyl (a+b)
Polyphenol
Protein
Carbohydrates
mg/gm of fresh tissue
0
50
100
150
200
250
300
Control
2
4
6
10
Concentration(in %)


Biochemical Constituents of Synedrella nodiflora Linn
under phytotoxicity (Stem extract)
Chlorophyl a
Chlorophyl b
Chlorophyl (a+b)
Polyphenol
Protein
Carbohydrates
mg/gm of fresh tissue
0
50
100
150
200
250
300
350
400
Control
2
4
6
10
Concentration(in %)

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