Studies on Allelopathic effects of aqueous leaf extracts of *Cyathocline purpurea* (Buch. Ham.exD.Don) Kuntz. and *Blumea lacera* (Burm.f.) DC. on seed germination and growth of plumule and radicle of *Vigna radiata* L.

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Introduction

Molisch (1937) proposed the term allelopathy for expressing the harmful effects that one plant species may have on another through the mechanism of chemical retardants escaping into the environment. The concept of allelopathy was further supported and further developed by Bonner (1950), Gummer and Beyar (1960), Evenari (1961), Whittaker (1970) and afterwards much work has been done on the allelopathy.

The number of papers are published in India and Abroad, few of them are Oudhia, *et al.* (1998) studied the Allelopathic effects of *Blumea lacera* L. on rice and common kharif weeds. Agrawal, *et.al.*(2004)studied the combined effects of enhanced ultraviolet-B radiation and mineral nutrients on growth, biomass accumulation and yield characteristics of two cultivars of *Vigna radiata* L. Moosavi, *et al.* (2011), shows the allelopathic effects of aqueous extract of leaf, stem and root of *Sorghum bicolor* on seed germination and seedling growth of *Vigna radiata* L. Basalingamma, *et al.* (2015) reported allelopathic inhibitory effect of aqueous extracts and increases inhibition with the concentrations of *Zingiber officinale* Rosc. on germination, vigour, growth and yield of *Vigna radiata* L.

During the field visits in Dapoli tahsil and in Konkan region, it was observed that the selected plants contain typical aroma and growing in thick patches and no other plants are growing in immediate contact. To prove the allelopathic effects scientifically of these two plants topic entitled, **'Studies on Allelopathic effects of aqueous leaf extracts of *Cyathocline purpurea* (Buch.-Ham.exD.Don) Kuntz. and *Blumea lacera* (Burm.f.) DC. on seed germination and growth of plumule and radicle of *Vigna radiata* L.'** undertaken in 2015-16.

***Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntz.**

Family – Compositae/Asteraceae

Vernacular names – Marathi- Gangotra, Hindi- Bandhaniya, Nepali-Galphulle.

It is an erect, delicate, strongly aromatic, glandular hairy annual or biennial herb. Hight - 20-50 cm high. Leaves- Sessile, 5 - 15cm long upper leaves are smaller segments are serrate-dentate to lobed and are covered with thin hair. Flowers - purple colour and occur in corymbs at the end of braches, glandular hairs.

***Blumea lacera* (Burm.f.) DC**

Family- compositae/Asteraceae

Vernacular name – Marathi- Bhamurda, Hindi – Jangli muli, Tamil - Kattumullangi.

It is annual herb, 1-2ft in height. Stems - Hairy or glandular herb are erect, simple or branched, very leafy. Leaves- Obovate or oblanceolate, smaller toward the top and toothed margins. Flowering – Bright yellow colour, axillary cymes, and collected in terminal spike like panicles.

Material and methods

The present investigation entitled "**Studies on Allelopathic effects of aqueous leaf extracts of *Cyathocline purpurea* (Buch.-Ham.exD.Don) Kuntz. and *Blumea lacera* (Burm.f.) DC. on seed germination and growth of plumule and radicle of *Vigna radiata* L**" was conducted at Dapoli urban Bank Senior Science Collage Dapoli, Department of Botany during the year 2015-2016.

The project was aimed to detect the allelopathic effect of selected plants on *Vigna radiata* L. bystuding the following parameters.

1. To study the effect of aqueous leaf extracts on Seed germination of *Vigna radiata*(L.).
2. To study the effect of aqueous leaf extracts on Plumule and Radical growth of *Vigna radiata*(L.).

The details of material used and methodology adopted during the course of investigation are given as follows

Firstly, the plants in flowering were collected from the surrounding area of Dapoli city in November to January 2015. Then plants were identified by using local floras- Cooke (1958), Singh *et.al.* (2000).

Preparation of water extracts solutions.

The leaves of *Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntz and *Blumea lacera* (Burm.f.)DC. dried in oven at 60 degree C. These dried leaves then grinded to fine powder in grinder. Then powder is weighed 2gm, 6 gm., 10 gm., 14 gm., 18 gm., and 22gm. respectively. Then these weighted powders allowed to leach in 125 ml distilled water.

The control was studied on germination of *Vigna radiata* L. seeds after 2 days 4 days, 6 days, 9 days, 11 days by using distilled water.

Seed germination test and Growth of plumule and radicle

The germination test was conducted in petriplates. Before germination petriplates were sterilized by absolute alcohol. The petriplates were covered with double layer of blotting paper. The 6 viable seeds of *Vigna radiata* were placed in each petriplates on paper. The thin film of solution on blotting paper in petriplate was made. Such different pates were prepared for different concentrations. The solutions were added every alternate day to each petriplate.

Five observations were recorded up to 11th day of soaking. The aqueous leaf extracts prepared were stored at deep freezer to avoid any bacterial or fungal contamination. The allelopathic effect of leachetes of *Cyathocline purpurea* and *Blumea lacera* were also studied on the growth of the plumule and radical of *Vignaradiata*L. at 2 days, 4 days, 6 days, 9 days, 11 days.

The germination percentage, shoot and root length in cm. were measured after every 2 days, 4 days, 6days, 9days, 11 days intervals.

Observations

Effect of aqueous leaf extracts on seed germination of *Vigna radiata* is shown in table no. 1

Table No. 1

	Seeds placed for germination	Germinated seeds	% of seed germination
Blumea lacera	6	6	100
Cyathocline purpurea	6	6	100

Effect of control and aqueous leaf extracts on length of radicle and plumule of *Vigna radiata* are shown in table no. 2, 3 and 4.

Table No. 2: Control

2 Days		4 Days		6 Days		9 Days		11 Days	
P	R	P	R	P	R	P	R	P	R
1.2	1.26	9.08	7.18	14.7	8.8	16.1	10.11	17	10.2

P=Plumule, R= Radicle

Table No.3: *Blumea lacera*

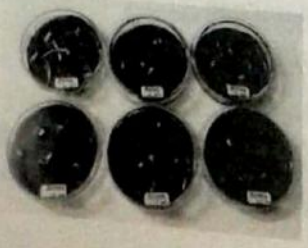
	2 Days		4 Days		6 Days		9 Days		11 Days	
	P	R	P	R	P	R	P	R	P	R
2 gm.	0.5	1.20	8.3	7.12	12.71	8.70	12.35	9.81	13.45	10
6 gm.	0.34	1.0	3.5	3.32	9.62	6.64	10.78	7.22	11.56	8.26
10 gm.	0.30	0.94	2.28	2.62	5.68	4.32	6.88	4.98	7.44	6.12
14 gm.	0.24	0.76	1.24	1.24	1.74	1.66	2. 04	1.46	2.72	2.54
18 gm.	0.22	0.68	1.10	1.22	1.24	1.38	1.54	1.26	2.58	2.42
22 gm.	0.12	0.38	0.78	1.08	0.80	1.18	0.86	1.14	1.78	2.04

P=Plumule, R= Radicle

Table No. 4: *Cyathocline purpurea*

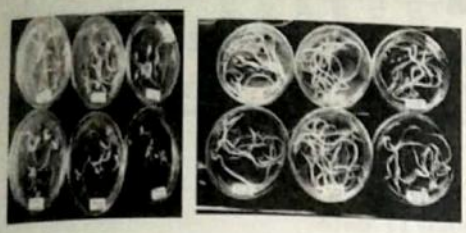
	2 Days		4 Days		6 days		9 Days		11 days	
	P	R	P	R	P	R	P	R	P	R
2 gm.	0 0	0.18	0.15	0.22	0.15	0.22	0.15	0.22	0.15	0.22
6 gm.	0.10	0.18	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.20
10 gm.	0.6	0.10	0.06	0.12	0.06	0.12	0.06	0.12	0.06	0.12
14g m.	0. 0	0.06	0. 0	0.06	0.0	0.06	0. 0	0.06	0. 0	0.06
18 gm.	0. 0	0.05	0. 0	0.04	0. 0	0.04	0. 0	0.04	0. 0	0.04
22 gm.	0. 0	0.03	0. 0	0.03	0.0	0.03	0. 0	.03	0. 0	0.03

Photo plate No. 1: Seed germination and plumule and radicle growth of *Vigna radiata* L. treated by different concentration of aqueous leaf extracts of *Blumea lacera*



2 Days

4 Days



6 Days

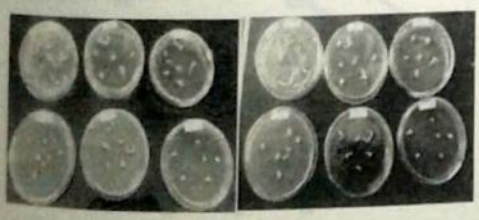
9Days

11 Days

Photo plate No. 2: Seed germination and growth of plumule and radicle of *Vigna radiata* L. treated by different concentration of aqueous leaf extracts of ***Cyathocline purpurea*(Buch.**

2 Days

4 Days



6 Days

9 Days

11 Days

Results and Discussion

The influences of plant including both beneficial and harmful interaction have important application in many fields of biological sciences; chemical compounds leached form plants and thus play a role in several part of the world in verity of climates.

The effect of aqueous leaf extracts of *Cyathocline purpurea* and *Blumea lacera* with different concentration was studied with relation to

1. Seed germination percentage of *Vigna radiata* L.
2. Plumule growth and Radicle growth of *Vigna radiata*

Seed percentage of *Vigna radiata* L.

In the present investigation seed germination percentage of *Vigna radiata* L. at different concentrations of aqueous leaf extracts of *Cyathocline purpurea* and *Blumea lacera* was found to be unaffected at primary stage of seed germination. The seeds germination was 100%

Plumule growth and Radicle growth of *Vigna radiata*

By analyzing the observations it become clear that the growth of plumule and radicle is inhibited by aqueous leaf extracts of both plants but in *Blumea lacera* as the concentration increases then inhibition of growth also increases and in *Cyathocline purpurea* Growth Inhibition was more at low concentration, slightly increases with increase in concentration and constant at high concentration of aqueous leaf extracts.

Inhition of growth (cm) = Control readings(cm) – Observed readings(cm)

Table No . 5: Inhition of growth by ***Blumea lacera***

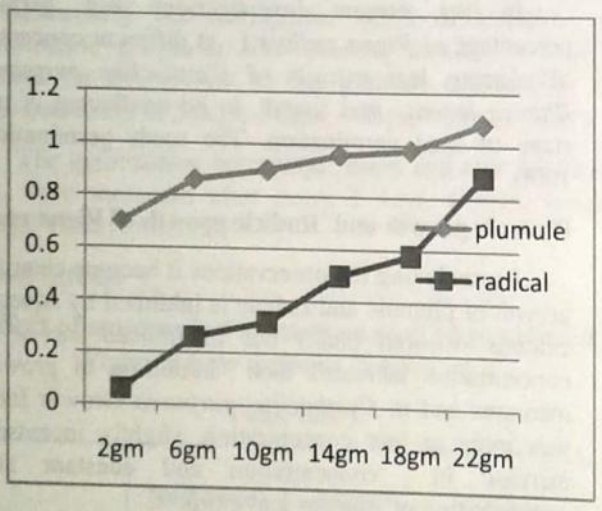
	2 Days		4 Days		6 Days		9 Days		11 Days	
	P	R	P	R	P	R	P	R	P	R
2 gm.	0.70	0.06	0.78	0.06	1.99	0.1	3.12	0.30	3.55	0.20
6 gm.	0.86	0.26	5.58	3.86	5.08	2.16	5.32	2.89	5.44	1.94
10 gm.	0.90	0.32	6.80	4.76	9.02	4.48	9.82	5.13	9.56	4.08
14gm	0.96	0.50	7.84	5.94	12.96	7.34	14.6	8.65	14.28	7.66

18gm	0.98	0.58	7.98	5.98	13.46	7.42	14.56	8.85	14.42	7.78
22gm	1.08	0.88	6.10	6.10	13.90	7.62	15.24	8.97	15.22	8.16

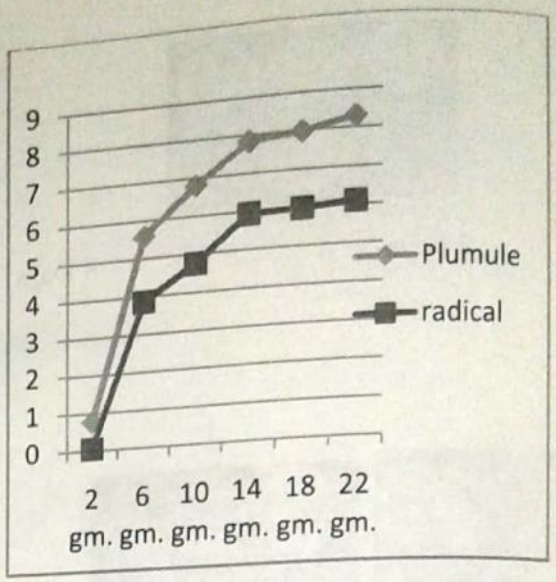
Table No . 6: Inhition of growth by ***Cyathocline purpurea***

	2 Days		4 Days		6 Days		9 Days		11 Days	
	P	R	P	R	P	R	P	R	P	R
2 gm.	1.20	1.08	8.9	6.9	14.5	8.5	15.9	9.8	16.8	9.9
6 gm.	1.1	1. 0	8.9	6.9	14.6	8.6	16.0	9.9	16.9	10.0
10 gm.	1.14	1.16	9.0	7. 0	14.6	8.6	16.0	9.9	16.9	10.0
14 gm.	1.20	1.20	9.0	7.10	14.7	8.7	16.1	10.0	17.8	10.1
18 gm.	1.20	1.20	9. 0	7.10	14.7	8.7	16.1	10.0	17.0	10.1
22 gm.	1.20	1.20	9. 0	7.15	14.7	8.7	16.1	10.0	17.0	10.1

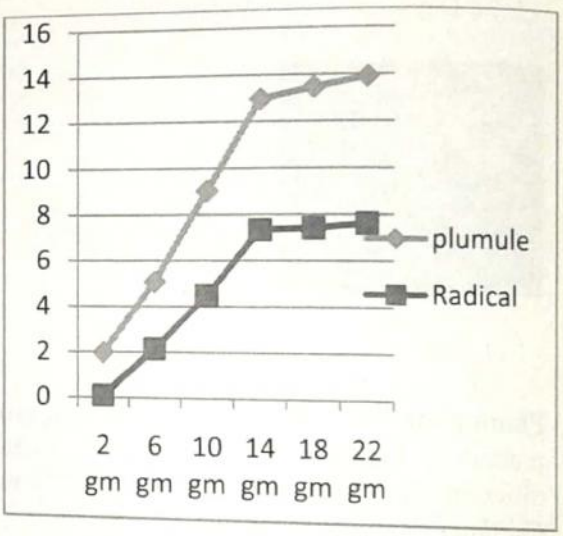
Graphical analysis of growth inhibition of Plumule and Radicle By *Blumea lacera*



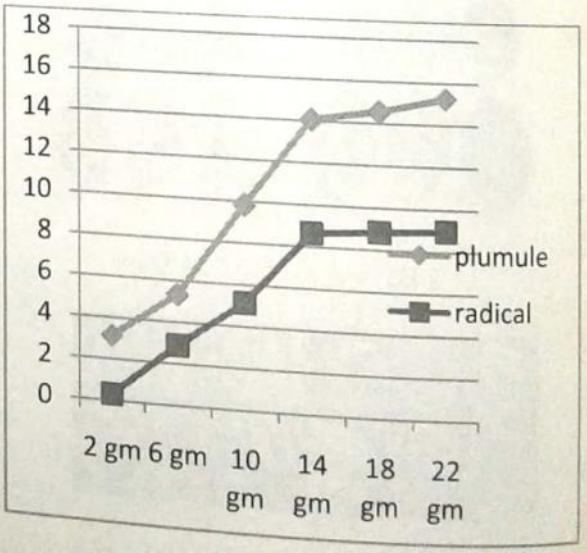
after 2 Days



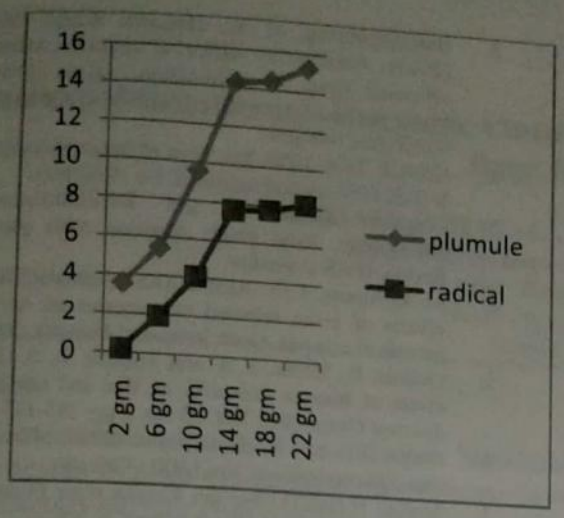
After 4 Days



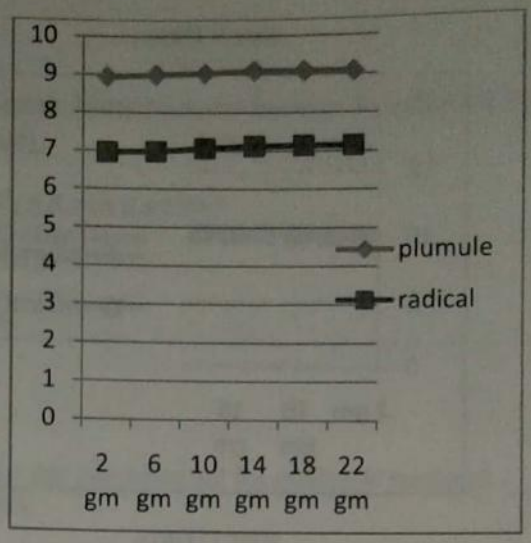
6 Days



9 Days

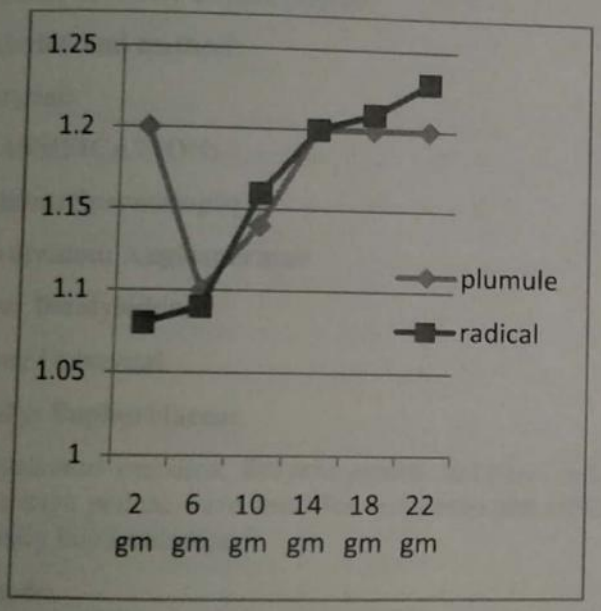


After 11 days

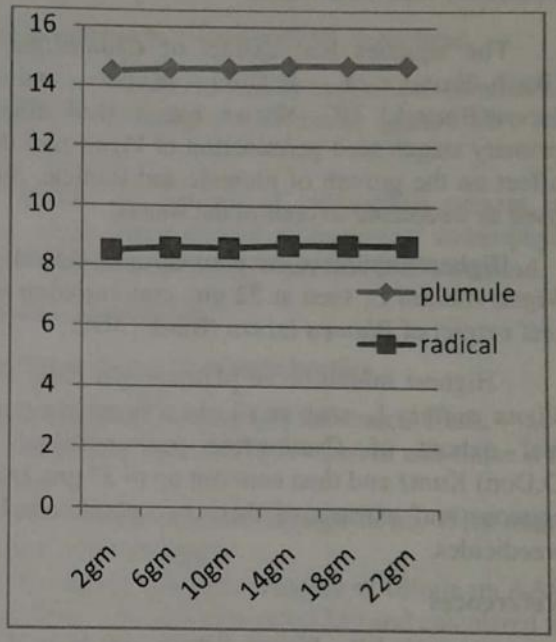


after 4Days

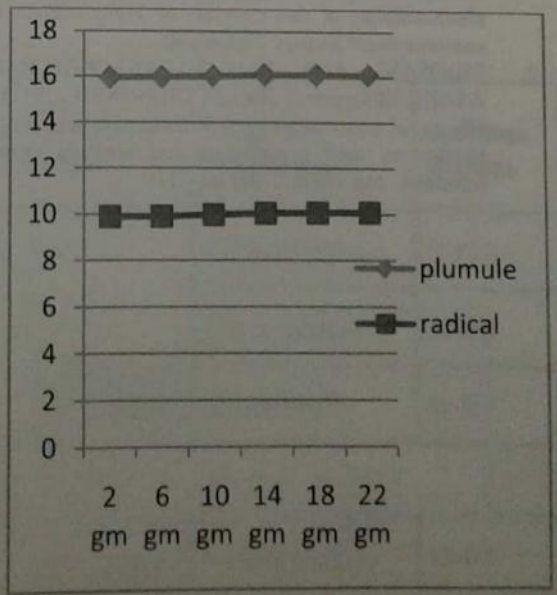
Graphical analysis of growth inhibition of Plumule and Radicle By *Cyathocline purpur*



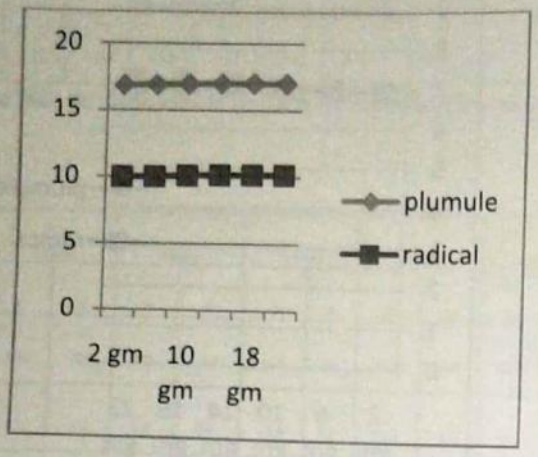
After 2 Days



After 6 Days



after 9 Days



after 11Days

Summery and Conclusion

The aqueous leaf extract of *Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntz and *Blumea lacera*(Burm.f.) DC. Shows not marked effect on the primary stages seed germination of *Vigna radiata* L. but it affect on the growth of plumule and Radicle. So it can be used as weedicide to control the weeds.

Highest inhibition of plumule and radical growth of *Vigna radiata* L. seen at **22** gm. concentration of aqueous leaf extract of *Blumea lacera* (Burm.f.)DC .

Highest inhibition of plumule and radical growth of *Vigna radiata* L. seen at 18 gm concentration of aqueous leaf extract of *Cyathocline purpurea*(Buch.-Ham. ex D.Don) Kuntz and then constant up to **22 gm**. In future, the aqueous leaf extracts of these two plants can be used as weedicides.

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