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ALLELOPATHIC EFFECTS OF WEED EXTRACTS ON CHLOROPHYLL CONTENT OF COWPEA (*VIGNA UNGICULATA* L.) PLANT

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ABSTRACT:

Allelopathy is a natural phenomenon in which one or more biochemical chemicals released by one organism influence the development, survival, and reproduction of other organisms. The targeted organism and the population can suffer beneficial (positive allelopathy) or harmful (negative allelopathy) impacts from these biological compounds. cowpea (*Vigna unguiculata* L.) plant treated with *Chloris barbata* L. and *Phyllanthus niruri* L. different extract (25%, 50%, 75% and 100%) compare with control. However, treatments with higher concentrations had positive effects on chlorophyll contents. The analyses revealed the presence of total chlorophyll content in the cowpea leaf extract, which were the highest chlorophyll amount in the 100% *Phyllanthus niruri* L. and lowest chlorophyll amount presence in 25% *Chloris barbata* L. It is highly recommended to establish crops in their early growth stages and they are producing commercial yields.

KEYWORDS: Allelochemicals, Allelopathic, Chlorophyll, Cowpea (*Vigna unguiculata* L.), Weed.

INTRODUCTION:

Positive and negative allelopathic effects are used to increase crop productivity. The negative (stimulatory) allelopathic effect of any weed

crop may be used to create environmentally, low-cost, and advantageous "Green growth promoters." Similarly, the positive (inhibitory) allelopathic effect of any weed or crop on weed can be used to produce "Green herbicides." (Srivastava *et al.*, 2015). According to Rice (1984), Putnam (1985), Putnam and Tang (1986), Rizvi and Rizvi (1992), and Narwal (1994), the majority of allelochemicals are secondary metabolites and are formed as byproducts of the primary metabolic pathway. Allelochemicals can be manipulated to produce stimulants or sustainable plant growth regulators (Srivastava *et al.*, 2010). The allelopathic interactions may have a significant effect on crop growth and weed management in environments (Khalid *et al.*, 2002). Allelopathy is a natural alternative that may be utilized to defend plants towards competitor plants, and allelochemicals are organic weedkillers that are safe for environment (Razavi, 2011).

Therefore, the goal of the current study is to investigate the allelopathic effects of *Chloris barbata* and *Phyllanthus niruri*, both types of common weeds that are commonly grown in Gujarat, on common crops. This information will be essential for helping farmers. The goal was to investigate the allelopathic effects of weed extract concentrations on *Vigna unguiculata* L. Walp chlorophyll content.

MATERIALS AND METHODS:

Preparation of extract

The weeds of *Chloris barbata* L. and *Phyllanthus niruri* L. were collected from the college campus. The whole plant was used for the preparation of extract. The weeds were dried at room temperature for 2 weeks, then they were grinded finely using an electric grinder and sieved through 2mm mesh. 10 grams of weed powder mixed with 1000ml of distilled water (1%w/v) at room temperature and stirred for 24 h. after that, the aqueous solution was filtered through a Whatman filter paper no.1 and used stock solution. From this 1% aqueous extract stock solution was diluted in distilled water to prepare further solution, different concentration (25%,50%, 75%,100%). The distilled water (DW) was used as the control for the spray treatment at different stages of growth (Pre-flowering, flowering and post-flowering) (Patanè *et al.*, 2023).

Determination of Chlorophyll Content (Arnon,1949)

20 to 40 ml of 80% acetone were added to one gram of freshly chopped, finely crushed leaves. After that, it performed a 5-minute centrifugation at 5000–10,000 rpm. The process was repeated with the transferred supernatant until the residue was colorless. In comparison to a blank solvent (acetone), the solution's absorbance at 645 and 663 nm. The following equation was used to determine the amounts of chlorophyll a, chlorophyll b, and total chlorophyll:

Total Chlorophyll ($\mu\text{g/ml}$): $20.2(\text{A645}) + 8.02(\text{A663})$

Chlorophyll a ($\mu\text{g/ml}$): $12.7(\text{A663}) - 2.69(\text{A645})$

Chlorophyll b ($\mu\text{g/ml}$): $22.9(\text{A645}) - 4.68(\text{A663})$

RESULTS:

Figure 1 is showing **chlorophyll a content** in effect of *Chloris barbata* L. and *Phyllanthus niruri* L. on Cowpea (*Vigna unguiculata*) in different stages *i.e.* pre-flowering (40 days), flowering stage (60 days) and fruiting stage (80 days).it was noted that highest chlorophyll a content was present in *Phyllanthus niruri* L. *i.e.* 100% and lowest chlorophyll a content was present in 25 % *Chloris barbata* L. as compare to control. **Figure 2** is showing **chlorophyll b content** in effect of *Chloris barbata* L. and *Phyllanthus niruri* L. on Cowpea (*Vigna unguiculata*) in different stages *i.e.* pre-flowering (40 days), flowering stage (60 days) and fruiting stage (80 days).it was noted that highest chlorophyll b content was present in *Phyllanthus niruri* L. *i.e.* 100% and lowest chlorophyll b content was present in 25 % *Chloris barbata* L. as compare to control. **Figure 3** is showing **Total chlorophyll content** in effect of *Chloris barbata* L. and *Phyllanthus niruri* L. on Cowpea (*Vigna unguiculata*) in different stages *i.e.*, pre-flowering (40 days), flowering stage (60 days) and fruiting stage (80 days) it was noted that highest Total chlorophyll content was present in *Phyllanthus niruri* L. *i.e.*, 100% and lowest Total chlorophyll content was present in 25 % *Chloris barbata* L. as compare to control.

DISCUSSION:

According to Srivastava *et al.*, (2015), at the early stages of growth (25 and 45 DAS), all concentrations of root extract increased the total chlorophyll content, and at 65 DAS, 40% of the root extract produced a difference in the chlorophyll content. Oyerinde *et al.*, (2009) noted that the allelopathic effect of *Tithonia diversifolia* on these immature plants of maize (*Zea mays* L.) resulted in decreased accumulation of chlorophyll a, chlorophyll b, and total chlorophyll. The concentration of chlorophyll in various wheat cultivars revealed both an increasing and a decreasing tendency to allelopathic impact of three weeds. As aqueous shoot extracts of *Xanthium strumarium* (0.5-2%) there was a lower concentration of chlorophyll an in the leaf contents and lentil seedling growth (Benyas, *et al.*, 2010).

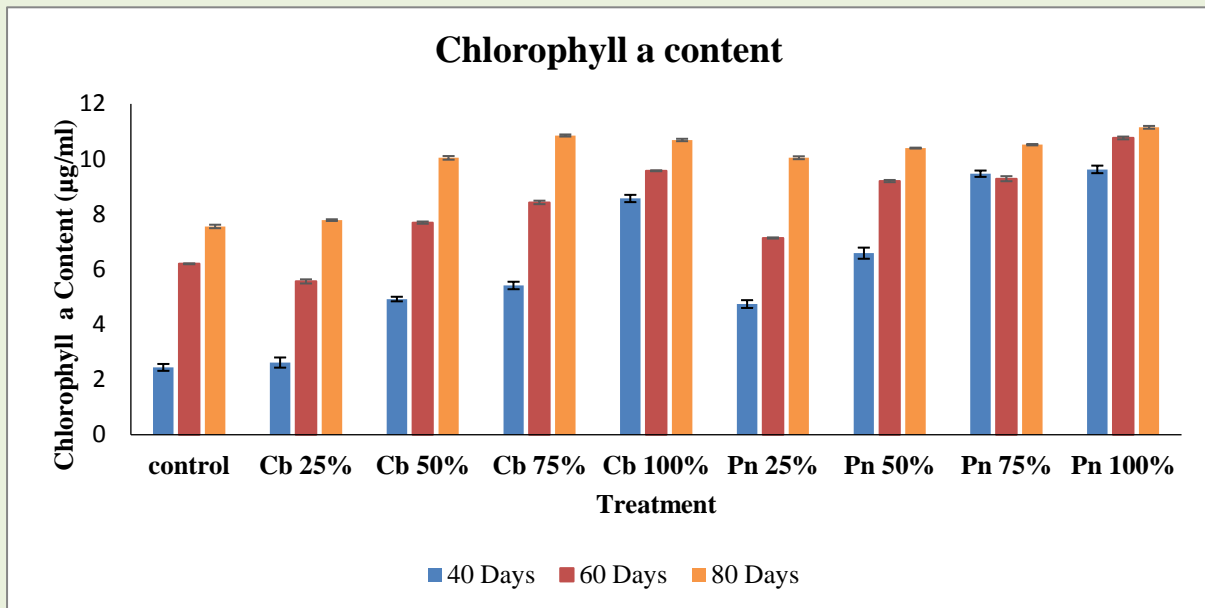
CONCLUSION:

During present investigation, study of allelopathic effect of *Chloris barbata* L. and *Phyllanthus niruri* L. weeds extracts have positive impact on cowpea (*Vigna unguiculata* L.) plant. The biochemical constituents like photosynthetic pigments (chl 'a', chl 'b' and total chlorophyll) were

higher concentration 100% *Phyllanthus niruri* L. extract effect on cowpea (*Vigna unguiculata* L.) leaf showed higher amount of chlorophyll and lower chlorophyll amount obtained that 25% *Chloris barbata* L. to compare the control. In turn, taking into consideration the potential effect of the weed extracts found at the highest concentration on cowpea chlorophyll content of these allelochemicals might be beneficial for plant. However, further studies are required to explore the potential effect of weeds on plant for possible application as a plant growth regulatory in agriculture.

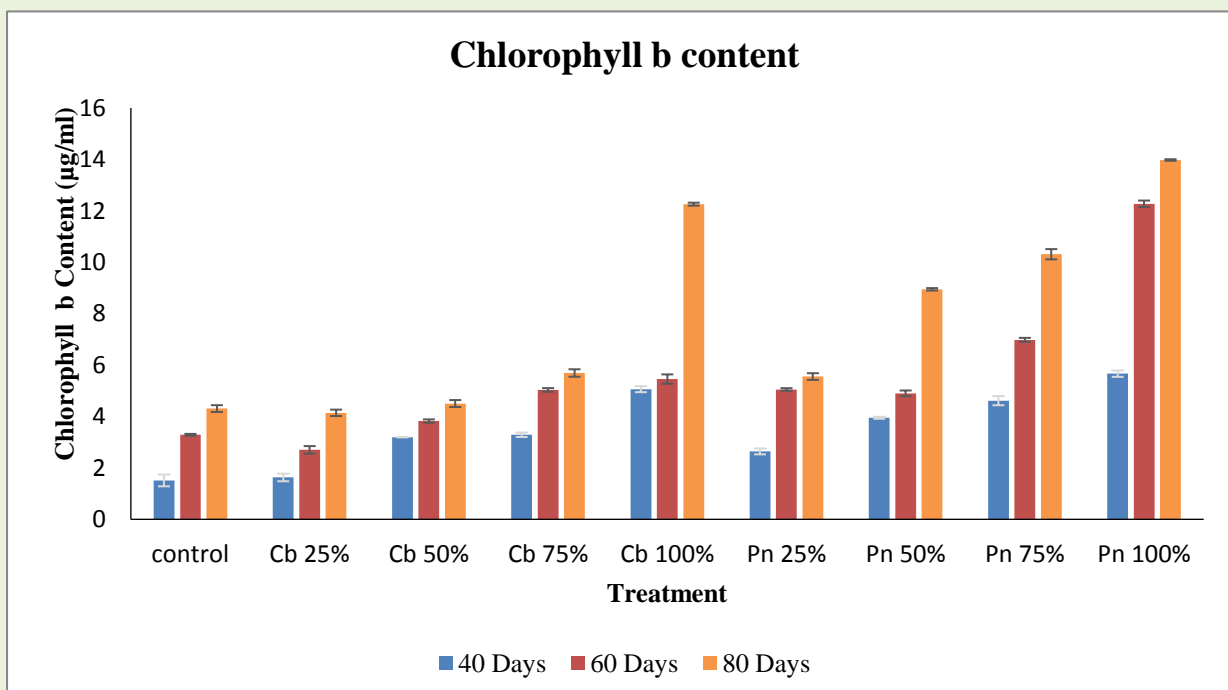
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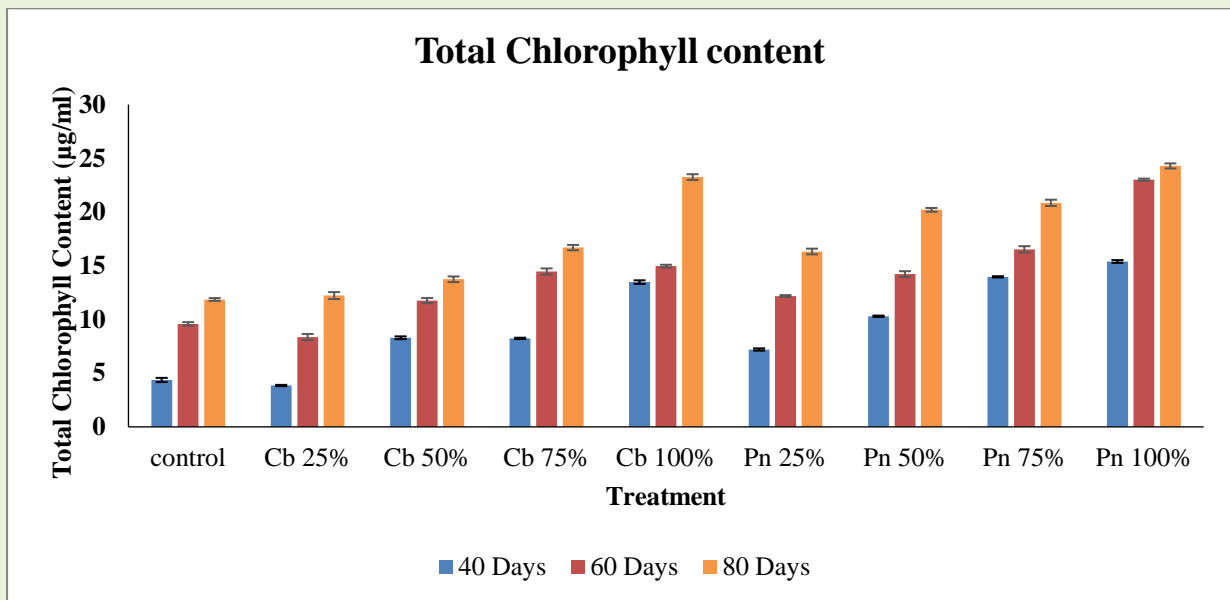
Pn- *Phyllanthus niruri* L. weed extracts and Cb- *Chloris barbata* L. extracts

Figure-1: Effect of *Phyllanthus niruri* L. and *Chloris barbata* L. extracts on cowpea (*Vigna unguiculata* (L.) Walp.)



Pn- *Phyllanthus niruri* L. weed extracts and Cb- *Chloris barbata* L. extracts

Figure-2: Effect of *Phyllanthus niruri* L. and *Chloris barbata* L. extracts on cowpea (*Vigna unguiculata* (L.) Walp.)



Pn- *Phyllanthus niruri* L. weed extracts and Cb- *Chloris barbata* L. extracts

Figure-3: Effect of *Phyllanthus niruri* L. and *Chloris barbata* L. extracts on cowpea (*Vigna unguiculata* (L.) Walp.)