# LOW COST DAIRY MANAGEMENT SYSTEM USING PIC MICROCONTROLLER

BY

**Palkar Prashant M.**
Department of Computer Science, Shahid Virpatni Laxmi Mahavidyalaya, Titave, Kolhapur, Maharashtra, India

**Shetage Sagar V.**
Department of Computer Science, Shahid Virpatni Laxmi Mahavidyalaya, Titave, Kolhapur, Maharashtra, India

**Barge Rutuja D.**
Department of Computer Science, Shahid Virpatni Laxmi Mahavidyalaya, Titave, Kolhapur, Maharashtra, India

**Dhenge Damini D.**
Department of Computer Science, Shahid Virpatni Laxmi Mahavidyalaya, Titave, Kolhapur, Maharashtra, India

**Balugade Kajal P.**
Department of Computer Science, Shahid Virpatni Laxmi Mahavidyalaya, Titave, Kolhapur, Maharashtra, India

**ABSTRACT:** Milk production in India is quadrupled in last 40 years and India is largest milk production country in the worlds. In India milk collected from farmer by dairy. Mostly all dairies are cooperative based and small scale. Therefore dairies are unable to spend expenditure on automated milk collection system using PC and software which is available in market. The proposed system make complete automation of milk collection system using PIC controller (PIC 16F 877A). The heart of system is PIC controller which replaces PC in conventional one. Due to PIC controller speed of operation increases, it helps to save time. In proposed system thermal printer is used for printing instead of the older bulkier one, and it not requires ink for printing mechanism as well as the thermal printer prints faster than the conventional printer. The system size is compact like portable device. Due to its simplicity it is more useful in villages, as there is no need of technical operator, farmers can also handle it properly.

**Keyword : PIC Programmable Interface Controller , ADC Analog to Digital Conversion, PC personnel computer**

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Correspondence Author: Palkar Prashant M.

## Introduction

Allelopathy, a phenomenon deeply embedded in the realm of plant interactions, represents a complex and dynamic ecological process wherein one plant species releases bioactive chemicals into its surrounding environment, influencing the growth, germination, or development of neighboring plants. This intricate interplay of chemical compounds, known as allelochemicals, can have both stimulatory and inhibitory effects, profoundly impacting the ecological landscape. Allelochemicals, spanning various chemical families, are classified into 14 groups based on chemical similarity, as defined by Rice in 1974. These categories encompass water-soluble organic acids, straight-chain alcohols, aliphatic aldehydes, and ketones; simple unsaturated lactones; long-chain fatty acids and polyacetylenes; benzoquinone, anthraquinone, and complex quinones; simple phenols, benzoic acid, and its derivatives; cinnamic acid and its derivatives; coumarin; flavonoids; tannins; terpenoids and steroids; amino acids and peptides; alkaloids and cyanohydrins; sulphide and glucosinolates; and purines and nucleosides. Additionally, plant growth regulators like salicylic acid, gibberellic acid, and ethylene are recognized as allelochemicals. The relevance of allelopathy in plant interactions lies in its capacity to shape community structure, regulate biodiversity, and influence ecosystem dynamics. By exuding allelochemicals, plants subtly engage in chemical warfare, either to gain a competitive advantage over neighboring species or to foster a more symbiotic coexistence. Understanding the intricacies of these chemical dialogues is imperative for unraveling the intricate tapestry of plant ecology.

In the context of the study, the allelopathic potential of Cynodon on Arachis hypogea adds a complex dimension to the intricate network of chemical interactions. Cynodon, a genus of grasses, is recognized for its diverse chemical arsenal, sparking considerable scientific interest in understanding its allelopathic interactions with Arachis hypogea. Acting as an allelopathic weed, Cynodon dactylon releases water-soluble allelochemicals in its plant parts, exhibiting phytotoxic effects that can hinder the growth and nutrient accumulation of associated crops. An analysis of weed extracts has uncovered the presence of several phenolic compounds, with Bermuda grass standing out for having the highest total phenol content. The allelopathic nature of Cynodon dactylon poses a potential threat to agricultural crops, given the adverse effects on plant germination and growth. Research by Abdul-Rahman and Al-Naib (1986) indicated that aqueous extracts and root exudates of Bermuda grass significantly impede the germination and growth of cotton and other weeds. Moreover, Vasilakoglou et al. (2005) observed that allelochemicals from aqueous extracts of Cynodon dactylon hindered the germination of various species, including cotton, corn, and barnyard grass (Echinochloa crusgalli).

ECAM provides a rapid, simple, and inexpensive procedure for the initial screening of the allelopathic potential of a crop against a target weed species under laboratory conditions.

## Materials and Method

### 1. Seeds germination assays

Seeds of peanuts were sterilized with 0.2% sodium hypochlorite solution for 10 min and rinsed with distilled water for 3 times to avoid pathogen contamination. Ten seeds from the above

tested species were equidistantly placed in Nutrient agar plate (diameter = 90 mm) and then treated with 8 ml of the three extracts prepared from Cyanadon at different concentrations (1%, 3%, and 5%) independently. Ultrapure water was used as the control, and 3 replicates of each treatment group were established. The dishes were then cultured in universal environmental test chamber at a constant temperature of 25 ± 0.5 °C, 85% humidity, and a controlled 12 h light/12 h dark cycle. Twenty milliliters of corresponding extract were added every 48 h to maintain the humidity of the filter paper in the petri dish. The number of the germinated seeds was counted from the second day after treatment and the count lasted for one week. In addition, the root length, stem length and biomass of each treatment were also measured.

## 2. Chlorophyll estimation

Chlorophyll extraction was conducted by homogenizing 2 g of tissue with 25 ml of an 80% acetone and water solution using a laboratory blender (BLENDER 8010E, MODEL 38BL40) for 2 minutes. Subsequently, filtration (MN G15¼ 125mm) was performed, and the resulting filtrate was transferred to a 100 ml volumetric flask covered with aluminum foil to prevent chlorophyll oxidation from light exposure. The flask was then filled to capacity with an 80% acetone solution. Absorption levels were measured at 663nm and 645nm using a HITACHI spectrophotometer U-2000. The concentration of chlorophyll (a, b, total) was quantified as mg/g fresh weight, employing the formula by Arnon for the determination of chlorophyll a, b, and total.

## 3. Protein by Lowry's method

Protein estimation was conducted following the method outlined by Lowry and Lopaz (1946), with Bovine serum albumin serving as the standard at a concentration of 1mg/ml. In the Lowry's method, the blue color developed results from the reduction of phosphomolybdic phosphotungstic components by amino acids like tyrosine and tryptophan found in the protein. Additionally, the color produced by the biuret reaction of the protein with alkaline cupric tartrate is measured. Various concentrations of the standard ranging from 0.1 to 1 mg/ml were prepared and adjusted to 1 mg/ml. Subsequently, 5ml of alkaline copper reagent was added, thoroughly mixed, and allowed to stand for 10 minutes at room temperature. Following this, 0.5 ml of diluted Folin's phenol reagent was incorporated and mixed well. The mixture underwent incubation for 30 minutes at room temperature, and the absorbance at 650 nm was measured spectrophotometrically. This process allowed for the estimation of protein concentrations in seaweed extracts.

## 4. Estimation of Proline Content

Proline content was determined following the method described by Edit Abraham et al. (2010). One gram of leaf material from both transgenic and wild-type (WT) control plants was ground in 20 ml of 3% sulfosalicylic acid, followed by centrifugation. To 2 ml of the resulting supernatant, 2 ml of glacial acetic acid and 2 ml of ninhydrin were added, and the mixture was boiled at 100°C for one hour. Afterward, the tubes were allowed to cool to room temperature,

and 4 ml of toluene was added and thoroughly mixed. The chromophore (toluene) was then separated from the aqueous phase, and its absorbance was measured at 520 nm.

5. **Statistical Analysis:**
   **Statistical analysis was conducted using one-way analysis of variance (ANOVA) to determine if there were any significant differences in germination among the different concentrations of plant extracts.**

## Result and conclusion

### 1. Seed Germination

**The findings indicate that water extracts of Cynodon demonstrated allelopathic inhibition on seed germination, with the degree of inhibition correlating with the concentration of the extract. Specifically, the water-soluble extract from Cynodon powder exhibited a notably significant inhibitory effect on the germination percentage of all three tested plants (Figure 1). This suggests that Cynodon possesses compounds that can hinder the germination process of other plants, potentially through allelopathy, where chemicals released by one plant affect the growth and development of neighboring plants. These results underscore the potential allelopathic properties of Cynodon and highlight its role in plant-plant interactions within ecosystems. Further studies could delve into identifying the specific compounds responsible for this inhibitory effect and elucidate the mechanisms underlying Cynodon's allelopathic activity.**

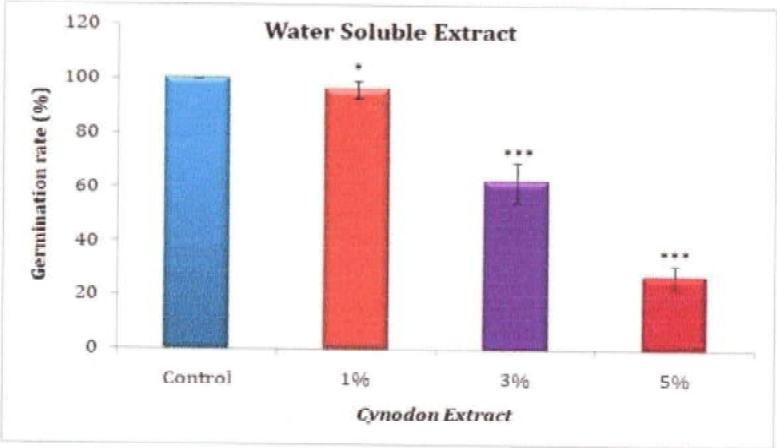


**Figure 1: The water-soluble extract of Cynodon inhibits the germination of Peanuts. n = 3,*P < 0.05, ***P < 0.001).**

**Allelopathic substances are indeed secondary metabolites produced by plants, and their synthesis often involves metabolic pathways such as the shikimic acid and isoprene pathways. These pathways have**

been extensively studied and reported by various authors, including Hussain and Reigosa (2011), Soltys et al. (2013), and Kong et al. (2000).

The known allelopathic substances encompass a wide range of chemical compounds, including but not limited to phenols, quinones, coumarins, flavonoids, terpenes, sugars, glycosides, alkaloids, and non-protein amino acids, as reported by Zhang et al. (2011). These substances can interfere with the growth and development of other plants, thereby influencing the dynamics of plant communities. Cynodon, being a perennial herbaceous plant, is known to be rich in various secondary metabolites, including volatile oils, flavonoids, polysaccharides, tannins, terpenes, and trace elements, as highlighted by Cao et al. (2018). These compounds contribute to the allelopathic potential of Cynodon and its ability to influence the surrounding plant species through chemical interactions.

## 2. Photosynthetic Pigments

Chlorophyll a levels seem to vary across the conditions, with the highest value observed at 1% and the lowest at 3%. Chlorophyll b levels show a decrease from Control to 5%, with the lowest value at 5%. Total Chlorophyll levels seem to decrease from Control to 5%, indicating an overall reduction in chlorophyll content (Figure 2).

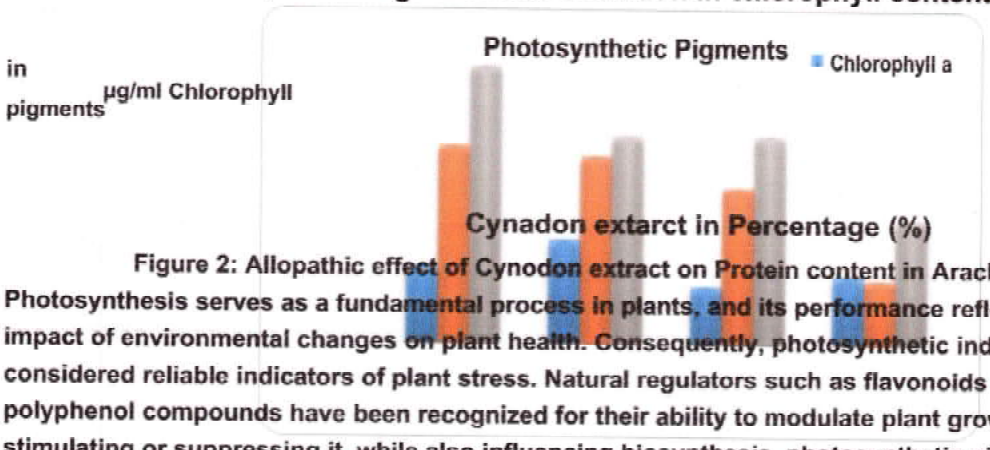


Figure 2: Allopathic effect of Cynodon extract on Protein content in Arachis hypogea

Photosynthesis serves as a fundamental process in plants, and its performance reflects the impact of environmental changes on plant health. Consequently, photosynthetic indices are considered reliable indicators of plant stress. Natural regulators such as flavonoids and polyphenol compounds have been recognized for their ability to modulate plant growth, either stimulating or suppressing it, while also influencing biosynthesis, photosynthetic pigments, and secondary metabolites in plants, as noted by Tanase et al. (2014).

Chlorophyll, being a crucial pigment in plant growth, plays a central role in photosynthesis by providing the basic framework for capturing light energy. Stressful environmental conditions can exert negative effects on chlorophyll levels, leading to significant reductions in plant leaf chlorophyll content, as observed by Janusauskaite and Kadzienė (2022). Numerous studies have reported on the reduction of chlorophyll content in plants following the application of allelopathic plant extracts. For

instance, studies by Kamal (2011), Khaliq et al. (2012), and Siyar et al. (2019) have highlighted how allelopathic substances can lead to decreases in chlorophyll levels, indicating a potential impact on photosynthetic efficiency and overall plant health.

### 3. Protein Content

Amount of protein shows sharp decline in 5% and then in 3% while 1% does not have any effect on a protein content. The protein in 3% and 5% may show a visible effect when the plant begins to loss in grow (Figure 3).

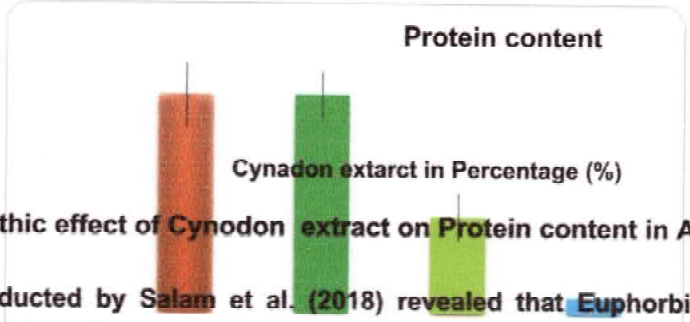


Figure 3: Allopathic effect of Cynodon extract on Protein content in Arachis hypogea

The research conducted by Salam et al. (2018) revealed that Euphorbia hierosolymitana exhibited allelopathic effects on various aspects of plant growth, including seed germination, seedling growth, chlorophyll content, and protein levels in wheat plants. This finding aligns with previous studies by Abu-Romman et al. (2010) and Qureshi et al. (2015), which also reported on the allelopathic impact of Euphorbia hierosolymitana on wheat.

Furthermore, allelochemicals present in plant extracts have been shown to inhibit protein levels in seedling growth. For instance, extracts from Acacia nilotica were found to significantly decrease protein levels in legume crops, as documented by Duhan and Lakshinarayana (1995) and Waqas et al. (2020).

### 4. Proline Content

Proline is synthesized when plant undergoes stress which is clearly indicated by high proline content in the seeds treated with different concentrations of extracts as compared to control. Clearly the extract of Cynodon dactylon has created stress in the germinating seeds (Figure 4).

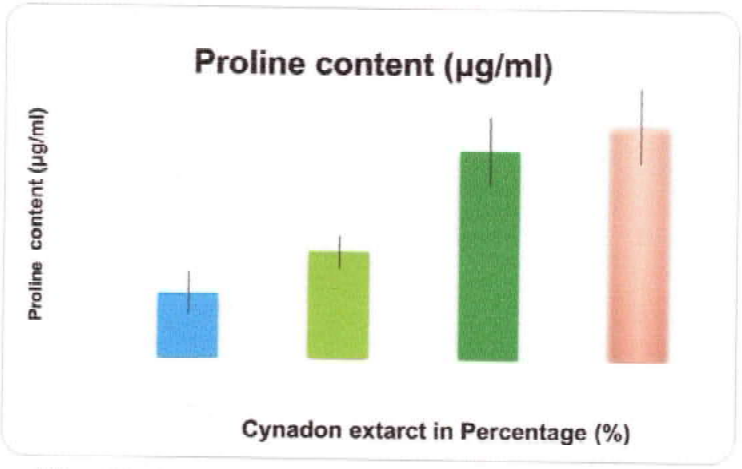


**Figure 4: Allelopathic effect of Cynodon extract on Proline content in Arachis hypogea**

The findings suggest that the aqueous extract exerted allelochemical stress on the growing plants, leading to observable effects. These results are consistent with previous studies by Abdulghadar and Nabat (2008), Al-Watban and Salama (2012), and Al-Taisan (2014), which also reported similar outcomes, indicating the allelopathic potential of the extract.

Proline, an amino acid, has been linked to various stress responses in plants, as noted by Kumar et al. (2003). As an osmolyte, proline serves as a crucial compatible solute, playing a vital role in osmotic adjustment in plants, as highlighted by Hoque et al. (2007). The observed increase in proline levels in response to allelochemical stress further supports the notion of plant adaptation to adverse conditions. This response mechanism allows plants to maintain osmotic balance and mitigate the effects of stressors such as allelochemicals.

## 5. Conclusion

From the above results it can be concluded that though germination is significantly affected immediately germination will definitely show visible fall due to lower concentrations of chlorophyll and proteins. This will lead to a lower rate of photosynthesis and tissue mass. All these stress factors may be tolerated to a large extent due to the high concentration of proline accumulation increasing with treatment.

In conclusion Cynodon shows a negative effect on Arachis and is best removed to increase yield and quality of Arachis.

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