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## Research Article

# Anti-Helminthic Syrup by Herbal Extract

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## ABSTRACT

Helminthiasis is a most common parasitic infection in the world. It may produce a serious risk to public health. Anthelmintic activity in paediatrics refers to use of drugs to treat parasitic worm infections in children. The various types of marketing preparations are available in the market. Finding innovative anthelmintics with a unique mode of action is imperative as a side effect and developing resistance to already prescribed anthelmintic medication pose a serious threat. Hence, the current study was carried out with aim to prepare and evaluate the anthelmintic activity with pineapple extract. The bromelain enzyme present in pineapple which is show anti-parasitic activity on nematodes. It has been used for centuries in medicines. It is also used as dietary supplement. Bromelain shows antihelmintic activity. The activity is done on earthworms which are comes under the class of nematodes. Here we done the test to determine the stability of the syrup. We performed PH test, turbidity, visual, physical stability, crystal growth and viscosity test. The evaluation study helps to know the safety and efficacy of syrup. Here we learn the formulation and evaluation of pineapple syrup on earthworms. We observe the antihelmintic activity as well as paralysis and death of the earthworms.


## INTRODUCTION

Helminthiasis is a worm infection. It is caused by helminths or parasitic worms which infect the human body. It can be transmitted through contaminated water, undercooked meat or skin penetration. Animals with infections are also treated with these medications without seriously harming the host. Anthelmintic drive out worms from the body by either stopping their growth or

killing them. Both humans and animals are impacted by parasitic helminths. Albendazole, Mebendazole, Thiobendazole have anthelmintic properties but, nature was essential in healing disease. Anatihelmintic drug directly kill the nematodes or parasite. The current research is work on the anthelmintic property of herbs which act as parasite. The given research is done on earthworm because the earthworms are comes under the category of nematodes. The pineapple is

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used as herbal extract and active ingredient in the formulation. Bromelain enzyme from pineapple shows the antihelmintic activity which helps in breakdown of proteins. Bromelain shows anthelmintic effect against gastrointestinal nematodes in both in-vitro and in-vivo studies. It helps in showing the activity of anthelmintic.



**Figure No 1: Ascaris Used for Experimental Purpose**

#### ❖ Syrup:

The Syrup is a saturated or concentrated, Viscous aqueous solution of sucrose with or without flavour\Medicinal substance in purified water. Simple syrup is a 66.7% W\W solution of sugar in purified water. It was prepared by hot process. The syrup contains sugar, anti-microbial agents, flavours, colorants etc.

#### ❖ Types of Syrup:

There are three types of syrup are as followed:

##### 1. Simple Syrup:

Simple syrup is a liquid sweetener made by dissolving sugar in water, typically in equal parts, though richer versions use a 2:1 sugar-to-water ratio. It's commonly used in cocktails, iced coffee, tea, and desserts because it blends smoothly without needing to dissolve granulated sugar. Simple syrup can be made quickly on the stovetop or even by shaking sugar and water together until

fully dissolved. It serves as a versatile base for flavoured syrups, with additions like mint, vanilla, citrus zest, or spices, enhancing drinks and dishes. Stored in a sealed container in the fridge, it lasts for several weeks.

##### 2. Medicated Syrup:

Medicated syrup is a sweet, flavored liquid formulation used to deliver medications, especially for children and individuals who have difficulty swallowing pills. It typically contains active pharmaceutical ingredients dissolved or suspended in a sugar-based solution, which helps mask the bitter taste of medicine. Common examples include cough syrups, antipyretics, and antihistamines. Medicated syrups may also contain preservatives, flavoring agents, and colorants to enhance stability and palatability. They are usually taken orally using a measuring spoon or cup for accurate dosing. Proper storage is essential to maintain efficacy, and users should follow dosage instructions carefully to avoid side effects or overdose.

##### 3. Flavoured Syrup:

Flavoured syrup is a sweet, concentrated liquid infused with various natural or artificial flavors such as vanilla, caramel, chocolate, fruit, or spices. It's commonly used to enhance the taste of beverages like coffee, tea, cocktails, milkshakes, and sodas, as well as in desserts, pancakes, and baked goods. Made by combining simple syrup (sugar and water) with flavoring agents, it offers a convenient way to add consistent taste without altering texture. Flavoured syrups may also include preservatives or colorings for longer shelf life and visual appeal. They are available in a wide variety, making them popular in both home and commercial kitchens. The Pineapple is used to enhanced the flavour but, in our experiment pineapple is a main active ingredient so it shows

medicated activity. Hence our syrup is the medicated and flavoured syrup.

#### ❖ Storage of Syrup:

- ❖ Keep away from direct sunlight due to exposure to light can degrade the flavor and quality.
- ❖ Stored in tightly sealed, airtight container and prevent contamination.
- ❖ Syrup may be dark colour due to fermentation of sugar.

#### ❖ MATERIALS AND METHOD:

##### A. Collection of Plant Material:

The Pineapple was collected from the local Villages of Kurvali, India.

##### B. Experimental Model:

Earthworm are selected for the experimental purpose due to the anatomical & Physiological resemblance with intestinal roundworm parasites of human being. The earthworms are obtained from moist soil from Walchandnagar, India. Here total three earthworms are used for study purpose.

##### C. Equipment's:

Magnetic stirrer, beaker, Measuring cylinder, viscometer, petri plate, burner & other required equipment's.

#### ❖ Composition of Pineapple Syrup:

**Table no. 1: Composition of Syrup**

Ingredients	Uses
1. Pineapple extract	Active pharmaceutical Ingredient
2. Sodium Benzoate	Preservative
3. Propyl Paraben	Antimicrobial agent
4. Citric acid	PH regulator
5. Sucrose	Sweetner

#### Pineapple:

- **Synonym:** Ananas Sativus, Bromelia Comosa
- **Common Name:** Ananas, Pineapple
- **Family:** Bromeliaceae
- **Scientific Name:** Ananas Comosus (L). Merr



**Figure No. 2: Pineapples**

The Pineapple is a tropical edible fruit. It grows as a small shrub. The plant has a short, stocky stem with tough, waxy leaves. Pineapple peel contains phytochemicals such as gallic acid, vanillin, Coumaric acid, arbutin, Sinapic acid. Bromelain is the main constituent which is present in stem, fruit, crown, core and leaves. It has been used for many clinical disorders. It may help in boost immunity, lower cancer risk and improve recovery time after surgery.

#### Raw Tests for Selection of Pineapple:

□ **Appearance:** Choose pineapples with a healthy green to golden-yellow skin. Uniform colour without dark spots, bruises, or Mold indicates ripeness and freshness.

□ **Firmness:** Gently press the pineapple—ripe fruit should be slightly soft but not mushy. Overly firm pineapples may be unripe.

□ **Aroma:** A ripe pineapple gives off a sweet, fragrant smell from the base. Lack of aroma or a

sour, fermented smell indicates under-ripeness or spoilage.

□ **Weight:** Heavier pineapples for their size tend to be juicier, which is ideal for syrup extraction.

□ **Leaf Test:** Gently tug on a central leaf from the crown—if it comes out easily, the fruit is ripe.

□ **Taste Test (if needed):** A small sample can be checked for sweetness, acidity, and flavor profile to ensure it's suitable for syrup formulation.

### Sodium Benzoate:

It is also known as benzoate of soda. It is sodium salt of benzoic acid. It is used as food preservative.



Figure No.2: Sodium Benzoate

#### ➤ Physical Properties:

- **Colour:** White
- **Odour:** Odourless
- **Appearance:** Amorphous powder
- **Solubility:** Very soluble in water

#### ➤ Chemical Properties:

- **Chemical Formula:**  $C_7H_5NaO_2$

- **Antimicrobial activity :** It has anti-microbial activity and is used as preservative in food product. It is used as food additive.

### Propyl Paraben:



Figure No.3: Propyl Paraben

It is used as anti-microbial agent.

#### ➤ Physical Properties:

- **Colour:** White
- **Odour:** Odourless
- **Appearance:** White powder
- **Taste:** Tasteless
- **Solubility:** Soluble in ethanol

#### ➤ Chemical Properties:

- **Chemical Formula:**  $C_{10}H_{12}O_3$
- **Stability:** Stable
- **Uses:** Anti-microbial agent

### Citric Acid:



Figure No.4: Citric Acid

#### ➤ Physical Properties:

- **Colour:** White



- **Odor:** Odourless
- **Appearance:** White Powder, Crystalline
- **Taste:** Sour
- **Solubility:** Highly soluble in water

➤ **Chemical Properties:**

- **Formula:** C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>
- **Chelating agent:** It can bind to metal ions, making it useful in various application like food preservative & cleaning.
- **Uses:** Used as food acidifier

Flavouring agent

Cleaning product

❖ **Tests for bromelain:**

**Ninhydrin Test:**

Take 1ml of sample in test tube.

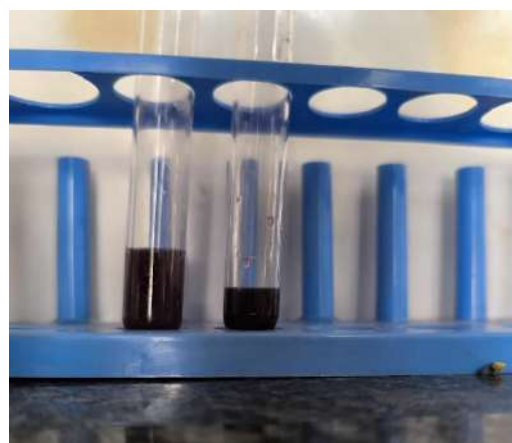
- Add few drops of ninhydrin reagent to test tube.
- Place the test tube in the water bath for 5 minutes and then allow cooling to room temperature.
- Colour change into purple shows presence of bromelain.

**Biuret test:**

- Take 1ml of sample in test tube.
- Add few drops of biuret reagent to the test tube.
- Mix it well
- Keep it aside after sometime colour changes to violet.



**Figure No 5: Equipments & Chemicals required For testing.**



**Figure No.6: Test performed for presence of Bromelain**

❖ **Preparation of Simple Syrup:**

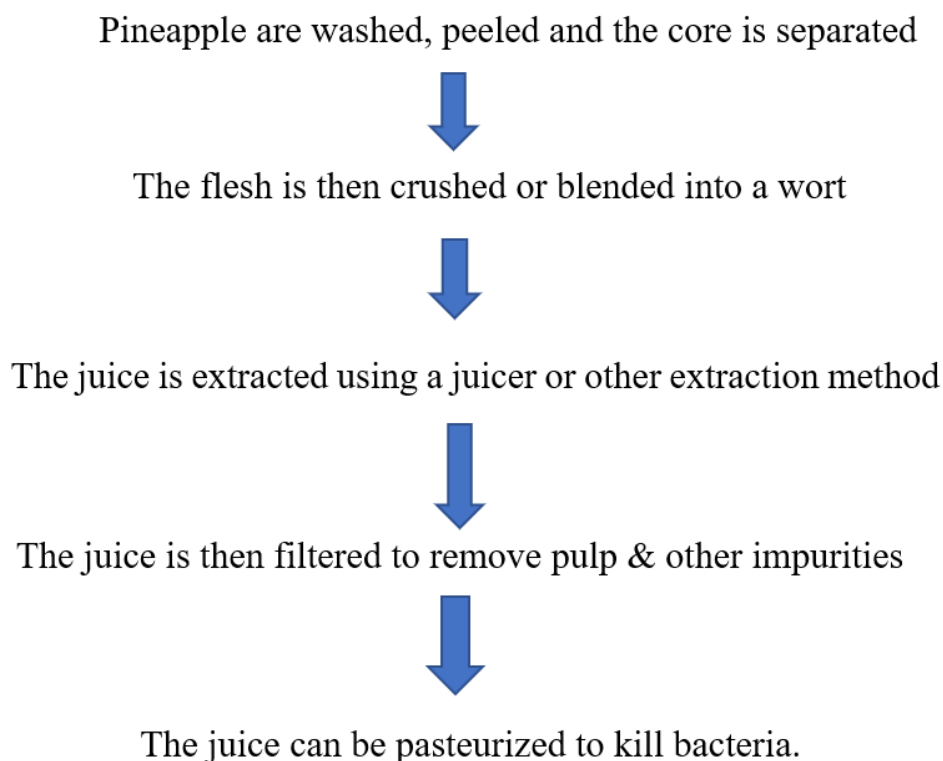
- ❖ To make 100ml of syrup. As per IP, add 66.7gm sucrose into 100ml water.
- ❖ Mix it well until particles get dissolved. Heat the solution on burner or water bath.

❖ **Formulation:**

**Table. No 2: Formulation of Syrup**

No	Ingredient	Quantity
1.	Sodium Benzoate	4gm
2.	Propyl paraben	0.8gm
3.	Citric acid	0.10gm
4.	Pineapple Extract	60ml
5.	Sucrose	10gm
6.	Simple syrup	q.s

## Extraction Process of Pineapple:



### ❖ Method of Pasteurization:

There are four methods of pasteurization.

1. Low-Temperature Long-Time Pasteurization (LTLT)
2. High-Temperature Short-Time Pasteurization (HTST)
3. Ultra Pasteurization (UP)
4. Flash Pasteurization

Here we use HTST process for pasteurization.

- **High-Temperature Short-Time Pasteurization:**

**Temperature:** 72<sup>0</sup>-75<sup>0</sup>C

**Time:** 15-20Sec

**Process:** The method involves heating the product to a Much higher temperature for a brief period. HTST is Commonly used for liquid product such as fruit juice and soft drinks.

### ❖ Preparation of Syrup:

Take all the ingredients and equipment's required for preparation of syrup. Take 60ml of pineapple extract in beaker. weigh all the ingredients and triturate well. Add 10ml of water in another beaker add excipient into it. Dissolve the ingredients properly. Add the pineapple extract into the previously prepared beaker. Mix it well with the help of magnetic stirrer and make up the volume with simple syrup to make it upto 100ml.



Figure No.6: Magnetic stirrer

#### ❖ Screening of Anthelmintic Activity for Pineapple Syrup:

Earthworms were procured from local villages from kurvali during experiment was carried out. These worms were washed with water to remove the materials and note down their size and length. The worms which showed the normal motility activity were selected for experiment. Three earthworms are selected for the experimental purpose. The Syrup is added dropwise into the petri dish to observed the motility and evolved response. The paralysis time was recorded at different time interval. The death time and paralysis time was recorded at room temperature. Worms were observed at regular intervals for evoked response, paralysis and death time is recorded.

#### ❖ Evaluation Tests for Pineapple Syrup:

1. PH Test
2. Turbidity Test
3. Visual Test
4. Physical Stability
5. Crystal Growth
6. Stability
7. Viscosity

##### 1. PH Test:

Determine the PH of Syrup by suitable means; it should be 3 to 6 The PH of Syrup is 4.72.

Table No.4: Time taken for paralysis and Death of earthworms

No	Number of earthworms	Paralysis response	Death response
1.	1	22sec	57sec
2.	1	24sec	45sec
3.	1	26sec	1.30min



Figure No.7: PH of Syrup

## 2. Turbidity Test:

It is used to determine the concentration of suspended particle in a sample of water by measuring the incident light scattered at right angle from the sample. The scattered light is captured by photodiode which produce an electronic signal that is converted to turbidity.

## 3. Visual Test:

With the visual inspection, the ingredient and the final product are carefully examined for purity and for appearance of product. For patient adherence compliance is critical so that it should be good looking and elegance in appearance.

## 4. Physical Stability:

**Colour:** Yellow

**Odour:** Pleasant

**Test:** Sweet

## 5. Crystal Growth:

The crystal growth was determined after 24hrs of the preparation.

## 6. Stability:

The product is kept under observation for 24,48,72hrs to observe the changes in the product.

## 7. Viscosity:

Clean Ostwald Viscometer with warm chromic acid.

- ✓ An Organic Solvent such as acetone.
- ✓ Mount Viscometer in vertical position on a suitable stand.
- ✓ Fill water in dry viscometer upto mark G.
- ✓ Count time required in second for water to flow from mark A to mark B.
- ✓ Repeat step 3 at least three times to obtained accurate reading.
- ✓ Rinse viscometer with test liquid and then fill upto mark A. Find out the time required for liquid to flow to mark.
- ✓ Determination of densities of liquid as mentioned in density determination experiments.



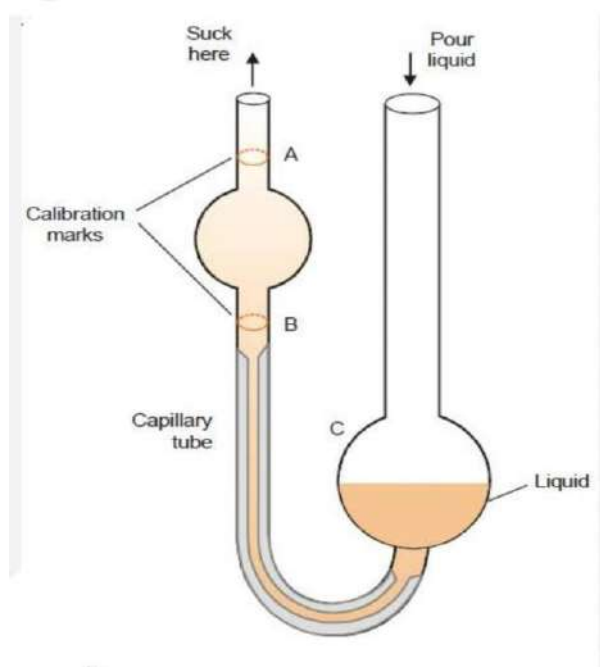


Figure No.8: Schematic Diagram of Ostwald Viscometer



Figure No.9: Determination of Viscosity with Ostwald Viscometer

- ❖ **Calculation For Viscosity: (Using Ostwald viscometer)**
  - **Weight of empty specific gravity bottle (W1) = 22.87g**
  - **Weight of Specific Gravity bottle + Water (W2)= 67.77g**
  - **Weight of Specific Gravity bottle + Sample liquid (W3) =80.02 g**
  - Density of liquid  $\rho_2$  = Mass of Liquid**
  - Mass of equal volume of water**

$$\rho_2 = W_3 - W_1 / W_2 - W_1$$

$$\rho_2 = 80.02 - 22.87 / 67.77 - 22.87$$

$$\rho_2 = 1.272 \text{g/ml}$$

- Density of Syrup ( $\rho_2$ ) = 1.272g/ml
- Density of water at room temperature ( $\rho_1$ ) = 0.997g/ml

(Standard Value)

$$\text{Viscosity of liquid } (\eta_2) = \frac{\rho_2 t_2}{\rho_1 t_1} \times \eta_1$$

$\rho_1$  = Density of water

$\rho_2$  = Density of test sample

$\eta_1$  = Viscosity of water

$\eta_2$  = Viscosity of test sample

$t_1$  = Mean time of flow of water from A to B

$t_2$  = Mean time of flow of test sample

Viscosity of water at room temperature ( $\eta_1$ ): 0.997 cp

Density of Sample ( $\rho_2$ ): 1.272g/ml

Density of water at room temperature ( $\rho_1$ ): 0.997g/ml

Table No. 4: Viscosity Calculation

Liquid Samples	1 (t1)	2(t2)	3(t3)	Mean Time	Density	Viscosity
1.Distilled water	22.04 Sec	18.43Sec	19.20Sec	19.83Sec	0.997g/ml	0.89 cp
2.Sample	1.35 Min	1.06Min	1.28Min	1.23Min	1.272g/ml	78.63cp

**Viscosity of Pineapple Syrup at room temperature = 78.63cp**

## CONCLUSION:

Pineapple Syrup have proved to be effective natural remedy against helminthiasis. It is effective against helminthiasis and shows anthelmintic property. It shows activity at low concentration. The formulation studies all the formulation were within specification also the physicochemical properties of syrup like colour, odour, taste, pH, viscosity were satisfactory. The result was within the specification so it was safer and effective.

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