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ANTIMICROBIAL ACTIVITY AND GASTRIC EMPTY TIME OF CARAWAY SEEDS

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ABSTRACT

Caraway is essential oil obtained from dried ripe of carum carvi (Family- Umbelliferae / Apiaceae) are one of earliest cultivated herb in Asia, Africa and Europe. It is commonly known as caraway (Hindi- kala jeera, Arabic- siyah zeera, and Sanskrit – Krishna jeeraka) which is mainly found in seeds. It was folk medicine for the treatment of many complains. Caraway is found in Europe, siberia, the Caucasus the near east Himalayas, Mongolia and Morocco. Carvi carum or caraway traditionally used for treatment of indigestion, pneumonia, and as appetizer, galactagogue and carminative. Essential oil, fixed oil and many other valuable extractive compound with industrial applications are prepared from caraway. The previous studies showed that plant contained many bioactive, metabolites.

Earthworm activities promote the release of bound residence and digestive activities of earthworm contribute to the process. The earthworm scientific name of Lumbricina. Physical effect include gastrointestinal abrasion and mixing. The residence time of liquid or solid foods in each segment of the GI tract is different. Since, most drugs are absorbed from the upper intestine (duodenum, jejunum, and ileum), the total effective time for drug absorption is 3-8 hours. This is why one has to take most drugs 3-6 time a day. Earthworm any one of more than 1800 species of terrestrial worm of the class oligochaeta - in particular members of the genus lumbricus . Earthworms have mucus and little hairs covering their skin that allow them to move through different types of soil. The benefits of earthworm to soil health are many. Some of these include increasing soil fertility, improving soil drainage, breaking the thatch, improving soil structure, getting deep root growth, and repairing damaged soil. Earthworm and red wriggler worms are perfectly safe to hold bare- handed.

KEYWORDS: *caraway, essential oil, Earthworm, Soil, carum carvi*

INTRODUCTION

Caraway (Carum carvi, Linn) seed is a mature, dried schizocarpic fruit of a biennial herb. The plant belongs to the family Umbelliferae as it has umbrella shaped flower head[3]. caraway seeds have an aromatic, warm and sharp taste with a characteristic odour and they have been used since ancient era to treat digestive disorders. Because of low water content caraway seeds are affected by humidity and temperature conditions where it is stored. The seeds are widely used as spice for flavoring and seasoning foods like bread, pickles, sauces and salads because of its pungent and anise like flavor and aroma[4] . Medicinal use of caraway fruit has been widespread in several ethno medical systems from Northern Europe to the Mediterranean regions, Russia, Iran, India.

Scientific classification [5]-[6]

- **Kingdom**:- plantae
- **Subkingdom**:- Tracheobionta
- **Super division**:- Spermatophytes
- **Division:-** Magnoliophyta
- **Class:-** Magnoliopsida
- **Subclass**:- Rosidae
- **Order**:- Apiales
- **Family**:- Apiaceae

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- **Genus**:- Carum
- **Species:-** carvi linn



Fig no. 1:- Carum Carvi Plant With Flowers.



Fig no.2:- Carum Carvi With Leave

Vernacular Names:- [6]-[7]

- **English**: Black Caraway, Caraway
- **Hindi**: Kalajira, Shahjira
- **Sanskrit**: Asitajiraka, Krishna jeeraka
- **Tamil**: Karamjiragam, Shimaishambu
- **Telugu**: Nalla Jeelakarra
- **Unani**: Zeeraa Siyaah, Kamoon, Kamoon-roomi
- **Urdu**: Kala Zira and Karo Jeero, Zira Siyah

Synopsis:- Caraway, Black caraway, Carum carvi.
Biological Source:- Dried ripe fruits of Carum carvi Linn. It contains not less than 2.5% volatile oil.[8]
Geographical Source:- It is indigenous to Holland and Central Europe. It is cultivated in Central Asia, Europe and many other countries. In India, it is found wild in north Himalayan region, and is cultivated in Kashmir, Kamoon, Garhwal and Chamba, At an altitude of 3000 to 4000 metres.[9]

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Fig no. 3:- Carum carvi seeds

Plant description:- carum carvi is the Biennial herb & multi branched.[10] Average height of herbs is 30 to 70 cm. It possess a deep Tap root. It has a high vernalization requirement to flowering stems in the second year. Flowers are produced on Umbels. They are white & 2-3 mm across the outer ones longer than inner ones. Flowers open in April onwards & are succeeded by fruits which are 3-6 mm long. Fruit ripening from Early June & July.[11]
Organoleptic characters:

Colour : Brown

Odour : Aromatic and characteristic

Taste : Hot, aromatic, spicy and characteristic

Extra features : Cremocarp or mericarps, five primary ridges in each mericarp, curved smooth muscle shape and orthospermous seeds.

Microscopy:-[8]

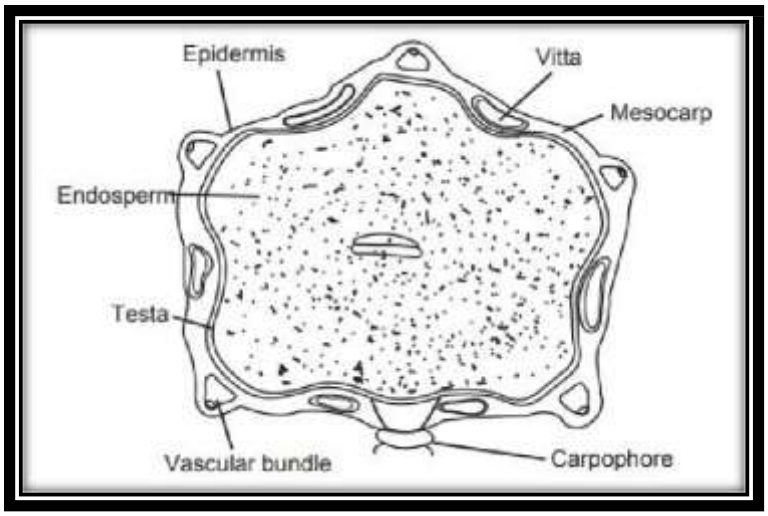


Fig no. 4:- Transverse section of caraway

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PHYTOCHEMICAL TESTING

Identification test of Phytoconstituents

chemical analysis of plant extracts :- The seed prepared were used for screening of phytochemicals and other biologically active compounds[12]. The active compound are carvone, limonene, y- terpinene, linalool, carvenone, and p-cymene, carveol, camphene, fenchen. The caraway seed extracts prepared in different solvents were screened for the presence of terpenoids, flavonoids, steroids, carbohydrate, protein, phenolic compound and tannins.

Sr.no	Phytochemicals	Chemical Test
1	Terpenoids	Salkowaski Test
2	Flavonoids	Sodium Hydroxide Test
3	Tannin	Ferric Chloride Test
4	Steroids	Lieberman Burchard's Test
5	Carbohydrate	Molisch Test
6	Phenol	Ferric Chloride Test
7	Alkaloids	Wagner's Test

Table no.1 : Test conducted for qualitative estimation of phytochemical content in caraway

Sr.no	Phytoconstituent Estimation	Standard used
1	Total flavonoids content	Quercetin
2	Phenol content	Tannic acid
3	Tannin content	Tannin acid
4	Terpenoids content	Linalool

Table no.2: Qualitative analysis of phytochemical of caraway seeds

METHOD AND MATERIAL :- REQUIREMENTS:

Sr. No	Name of apparatus
1	Conical flask
2	Water bath
3	Tripod
4	Stirrer
5	Petri dish
6	Beaker
7	Measuring cylinder
8	Dropper

Table no. 1: Apparatus CHEMICAL

Sr. No	Ingredients	Quantity requirement (for 250 ml)	Quantity taken (for 250 ml)	Uses
1	Agar	3.75g	3.75g	Growing bacteria on culture plate and test tube
2	Peptone	1.25g	1.25g	Microbial growth media
3	Sodium chloride	1.25g	1.25g	Antibactrial agent
4	Beef extract	0.75g	0.75g	Culture media
5	Distilled water	q.s	q.s	Vehicle

Table no. 2:- Nutrients Agar

ANIMAL :- Earthworm INSTRUMENT

1. Autoclave
2. Incubator PROCEDUCES
    1) In this process solid ingredients are placed in stoppered container with the whole of the solvent and allowed to stand for a period of at least 3 days (3- 7 days)

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2) Suspend nutrient agar powder and other ingredients (mentioned under chemical formula) in required quantity (250ml) of Distilled water.
3) Heat this mixture while stirring to fully dissolve all components.
4) Pour the media in conical flask and cover the cotton plug.
5) Autoclave the dissolved mixture contained in conical flask at 121°c in 15 min.
6) Once the nutrient agar has been Autoclaved, allow it to cool and preserve for further use.
7) First kept in autoclave in petri dish then kept in incubator for 3-4 days.



Fig no. 5:- Growth of Bacteria

DISCUSSION

In this process solid ingredients are placed in stoppered container with the whole of the solvent and allowed to stand for a period of at least 3 days (3- 7 days).

The process in which properly communicated drug is placed or permitted to soak in a solvent for specific period of time until the cellular structure is softened and penetrated by the solvent and soluble constituent are dissolved and extracted out.

Sr.no	Ingredients	Quantity requirements for 250 ml	Quantity taken for 250 ml
1	Peptone	1.25g	1.25g
2	Beef extract	0.75g	0.75g
3	Sodium chloride	1.25g	1.25g
4	Agar	3.75g	3.75g
5	Distilled water	q.s	q.s

Table 1:- Nutrient Agar Agar well diffusion method

The antibacterial activity was performed with the agar diffusion Method.[13] Fifty ml-portions of the melted sterile TSA, SDA Maintained at 50 °C, were inoculated, each with 100 ml of properly Diluted inoculum and mixed well. The inoculated medium was Poured into sterile petri dish (15 cm) and allowed to solidify. Maintain the plates at room temperature for about 2 h and then incubate the plates at 30-35 °C for 24 and 48 h in case Of bacteria and yeast respectively. Thrresultant inhibition zones Were measured and the average values are taken. Different explant (fruit,leave, and bark) of Z.armatum were employed for the assessment of in vitro

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antibacteriactivity using of agar well diffusion method against gram positive bacterial (Micrococcus luteus, Bacillus subtilis, Staphyococcus aureus and Streptococcus faecalis) and gram negetive bacteria (E.coli, proteus vulgaris, klebsiella pneumoniae, Streptococcus viridans, pseudomonas multocida and pseudomonas aeruginosa.

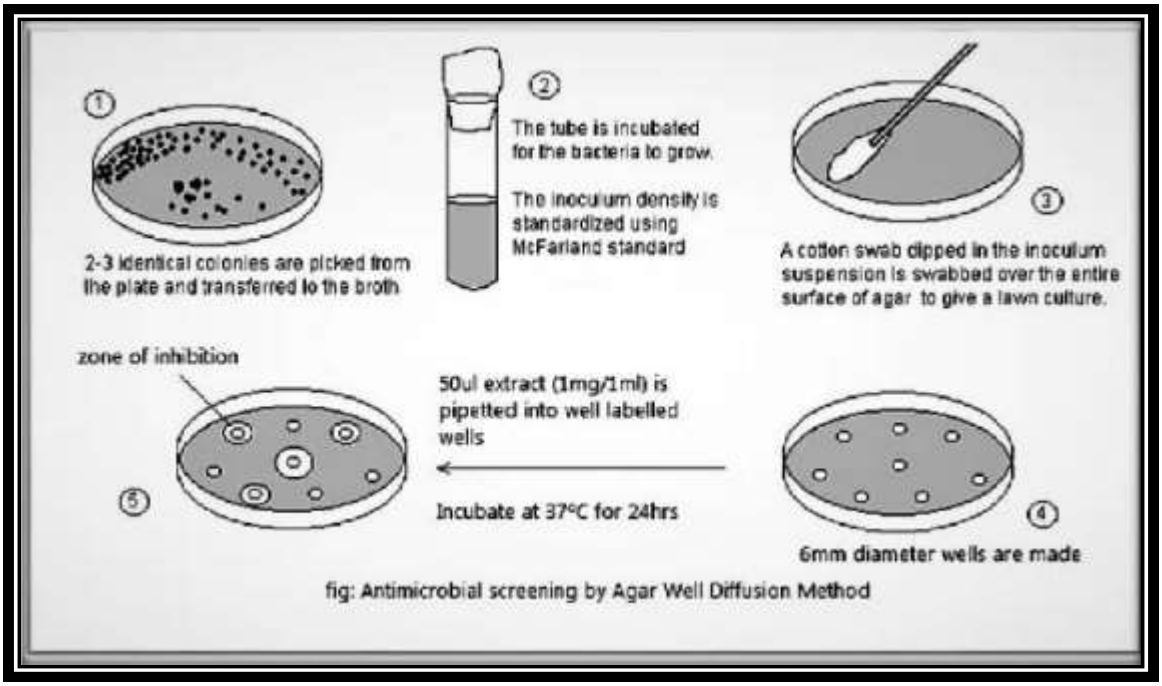


fig: Antimicrobial screening by Agar Well Diffusion Method

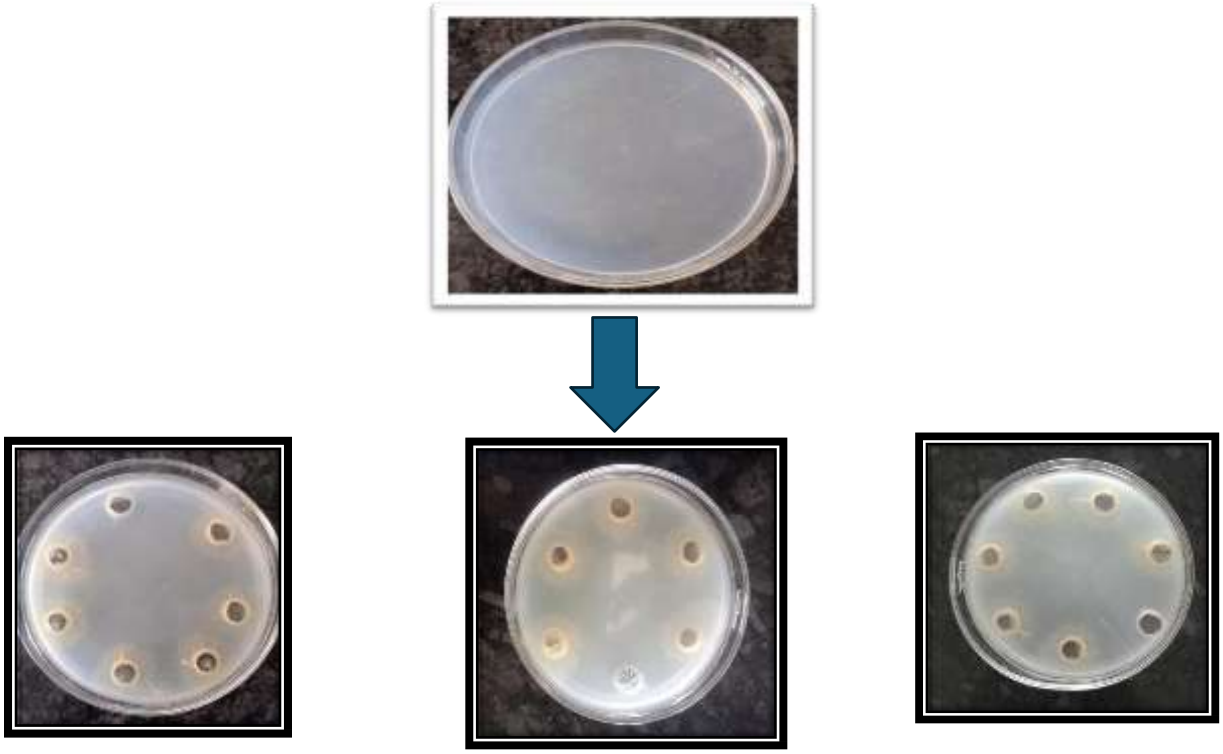


Fig no. 7:- Antimicrobial assay by zone of inhibition method

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Sr. No	Drug	Quantity	Diameter (kill)	Total Diameter
1	Antibiotics	7.6 drop	0.8	1.6
2	Test 1	7.4 drop	0.82	1.6
3	Test 2	7.8 drop	0.85	1.7
4	Test 3	7.8 drop	0.82	1.6
5	Normal	7.3 drop	0.7	1.4

Table no.5: Antimicrobial assay by zone of inhibition of caraway

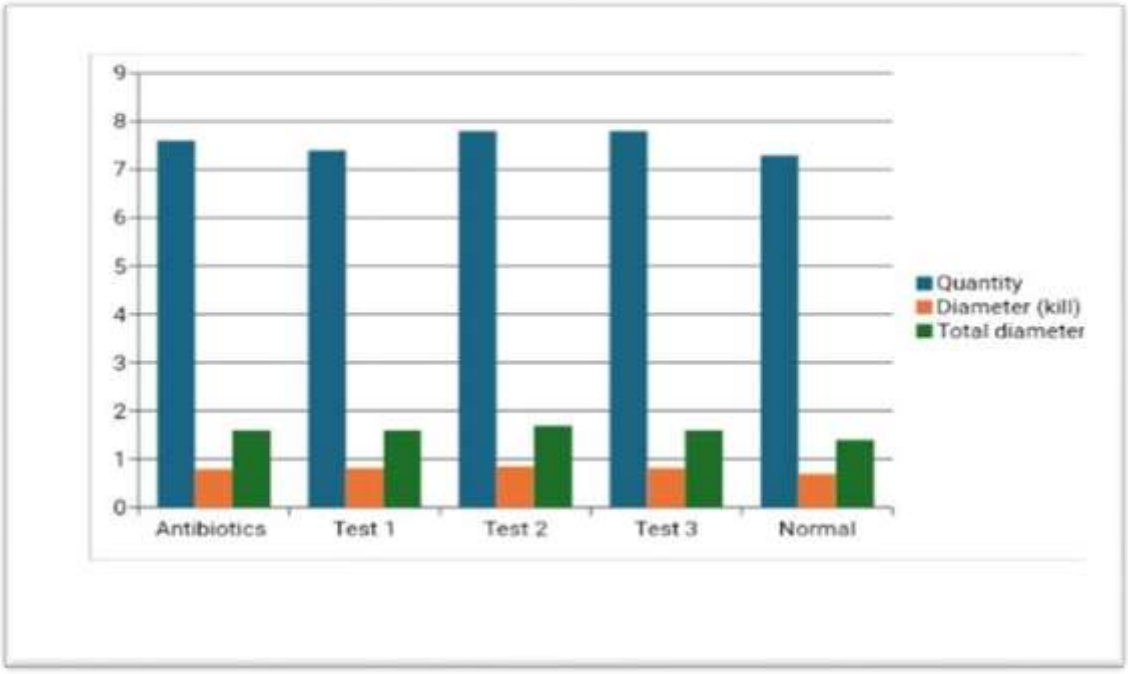


Fig no.1: Antimicrobial activity by zone of inhibition of caraway

Assay of antibacterial activity in MSE and WSE
Activities of different seed extract (MSE and WSE) against the test organisms were expressed as zone of inhibition (in mm). Zone of inhibition (mm) on MH- medium was checked for two different concentraction of the seed extract (5.0 mg/ml and 10.0 mg/ml). Further MIC was done using 96- vial titre plate to check for the minimum concentraction of the seed extract required to inhibit growth of selected pathogenic microbes.

Test organism	Zone of inhibition (mm) M1 (5.0 mg/mL)	Zone of inhibition (mm) M2 (10.0 mg/mL)
Staphylococcus aureus (ATCC 6538)	12.3+- 0.89	24.0+- 1.22
Salmonella typhimurium (NCTC 74)	_	14.6+- 1.66
Escherichia coil (ATCC 25922)	11.0 +- 1.23	13.0+- 0.78
Staphylococcus epidermidis (ATCC 12228)	11.0+- 0.76	14.3+- 0.98

Table no.6: Antibacterial activity of caraway seed extract

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Microorganisms	MSE tested concentration (mg/mL)									MIC (mg/mL)
	10	5	2.5	1.25	0.625	0.312	0.156	0.078	0.039	
S. aureus (ATCC 6538)	-	-	-	-	-	-	+	+	+	0.312
S. typhimurium (NCTC 74)	-	-	-	+	+	+	+	+	+	2.5
E. coli (ATCC 25922)	-	-	-	-	-	+	+	+	+	0.625
S. epidermidis (ATCC 12228)	-	-	-	-	+	+	+	+	+	1.25

-Indicates no bacterial growth.
+Indicates turbidity/ growth of selected bacterial strains

Table no.8: MIC of MSE of carum carvi against selected pathogenic bacterial strains

CONCLUSION

Caraway is helps to kill microorganisms. It get desired effect against microorganisms as compared to other drug. It kill the colonies of bacteria. It gives bacteriocital activity.

The culture medium treated with caraway it get more antibacterial activity as compared to culture medium treated with saline solution/ test solution.

Method -2:- Gastric Empty Time INTRODUCTION:-

Approximately 4400 species have been identified in the world however few species are used in the process of vermicomposting[14]. The earthworms are hermaphrodite, segmented worms, bilaterally symmetrical, with an external gland (clitellum) for producing the egg case (cocoon), a sensory lobe in front of the mouth (prostomium), and an anus at the end of the animal body, with a small number of bristles (setae) on each segment[15]. Based on these features the earthworms can be taxonomically classified[16]. Earthworm's bodies are made up of ring like segment called annuali. These segment are covered in setae or small bristles which the worm uses to move and burrow. These terrestrial worm typically dwell in soil and moist leaf litter.

The residence time of liquid and solid foods in each segment of the GI tract is different. Since most drug are absorbed from the upper intestinal (duodenum Jejunum and ileum) the total effective time for drug absorption is 3-8 hrs.

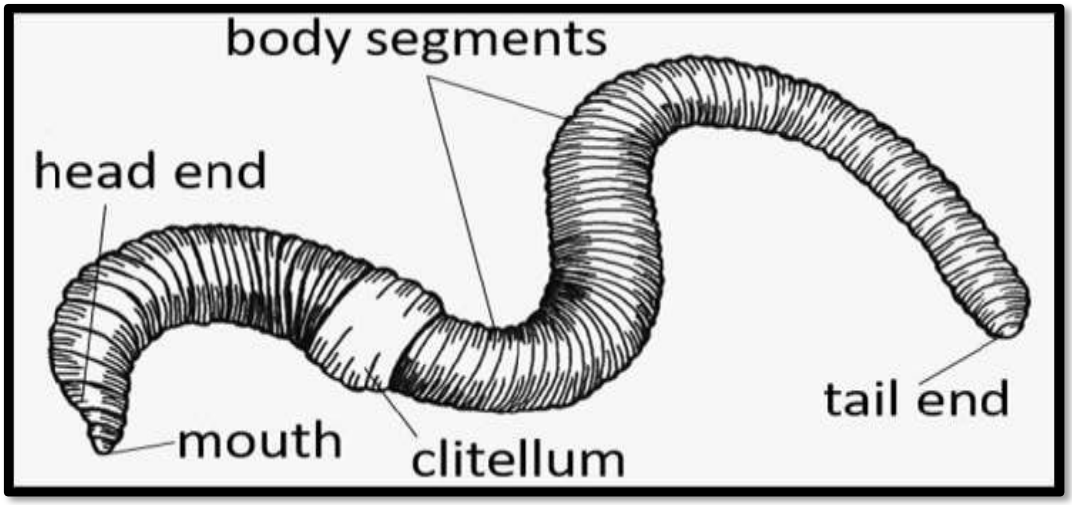


Fig no. 8:- Earthworm

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PROCEDURE

1) To take an earthworm from soil in a container.
2) Keep it beaker wash it properly
3) Transfer it into 4 different petri dish and put the earthworm.
4) The we add the caraway drug in the concentration of 5ml, 10ml, 15ml and normal/saline solution respectively.
5) Each petri dishes kept for different time interval.
6) After that observe and measure the gastric retention time of the earthworm.

DISCUSSION

Earthworm is a reddish brown terrestrial invertebrates that inhibit the upper layer of moist soil. In the garden, they can be traced by their faecal deposits known as worm castings. The common indian earthworm are pheretima and lumbricus. The body is divided into the more than hundred short segment which are similar (metameres about 100- 120 in number.

Anterior end consist of mouths and the prostomium a lobe which serve as a covering for the mouth and as a wedge to force open crack in the soil into which the earthworm may crawl. Earthworm species are generally categories environmentally as being either epigeic, endogeic and anecic.

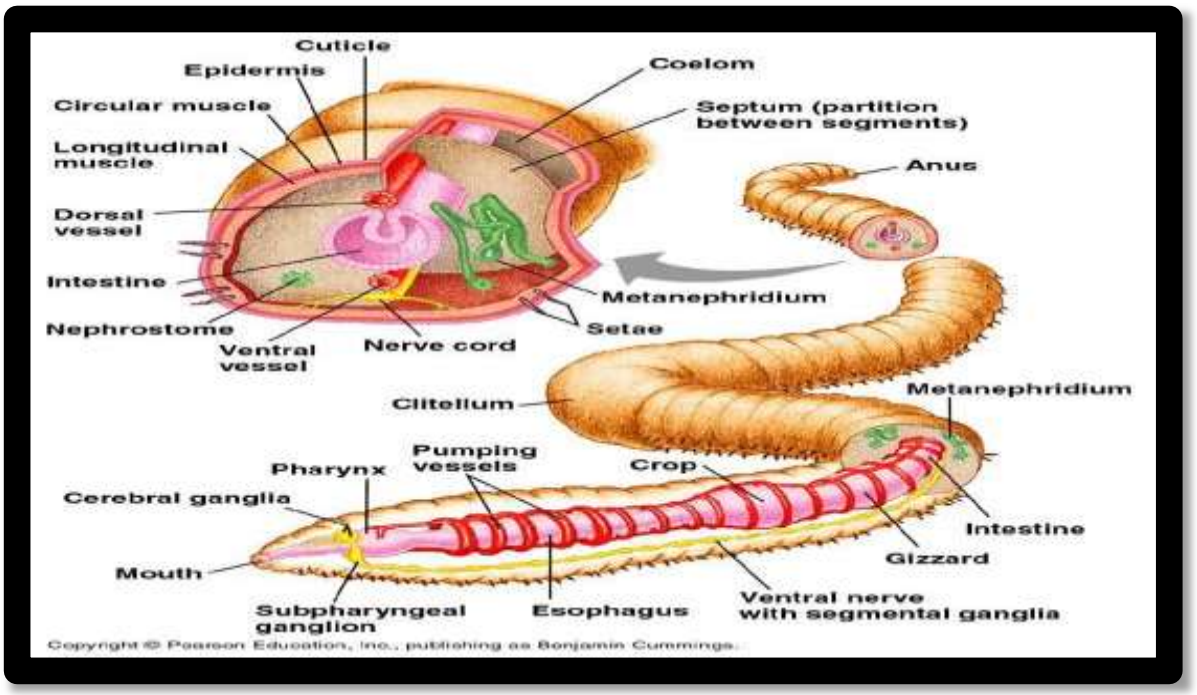


Fig no. 9:- Digestive of earthworm

Sr. No	Quantity (ml)	Effect of time
1	5ml	20min
2	10ml	14min
3	15ml	5min
4	Normal	No effect

Table no.10 : Gastric transit time of caraway drug

CONCLUSION

Residence time in each segment of GI tract in earthworm is different since most drug absorbed from the upper intestinal.
As we increase the quantity of caraway drug, more quickly the material inside the earthworm stomach get remove.

That is As drug concentration increase the time required to remove the material inside also get reduced. As we increase the quantity of caraway drug, the gastric retention time in earthworm reduced that is it will remove the dirt inside them Faster.

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And vice versa, If the concentration of caraway drug given is low, it take more time to remove dirt from the earthworm.

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