

Study On Time Consumption Behavior Patterns Of *Perionyx excavatus* On Treatment With Alcoholic Beverages

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Abstract: *Perionyx excavatus* is commonly regarded as a composting earthworm or Indian blues. The specimen was collected at Gandhi Krishi Vignana Kendra (GKVK) an Agricultural University in Bengaluru, Karnataka. Cow dung is the only compost used to do the rearing and maintenance of *Perionyx excavatus*. In the current study, two alcoholic beverages Royal Challenge (RC) and Black & White (B&W) were treated to *Perionyx excavatus*. To study the behaviour changes, parameters like, Burrowing Time (BT), Sedation Time (ST) and Killing Time (KT) were experimented on the earthworm. As the concentration increased the Burrowing Time (BT) increased (5%), the comparison between RC and B&W concluded that the RC treated Burrowing Time (BT) was greater than that of B&W. As the alcoholic concentration increased the Sedation Time (ST) decreases (100%). The Killing Time (KT) decreased with an increase in alcoholic concentration (100%). Specific Gravity (SG) of RC and B&W was calculated to check the alcohol concentration. The percentage of alcoholic content in both beverages was almost similar i.e., 47.55% (RC) and 47.71% (B&W).

Keywords: *Perionyx excavatus* (Pe), Royal Challenge (RC), Black & White (B&W), Burrowing Time (BT), Sedation Time (ST), Killing Time (KT), Specific Gravity (SG).

I. Introduction:

Earthworms are macroscopic clitellate oligochaete annelids that lives in soil. (Ali S and Kashem MA, 2018) [1]. *Perionyx excavatus* commonly regarded as composting earthworm or Indian blues, belongs to Kingdom-Animalia, Phylum-Annelida, Class-clitellata, Subclass-oligocheata Order-Haplotaxida, Family-megascolecidae, Genus-Perionyx, species-excavatus. *Perionyx excavatus* is a very prolific epigenic species utilised successfully in vermicomposting (Sophie A Viljoen and Reinecke A.J, 1997) [10]. It is endemic to southern regions of Asia and Phillipines. *Perionyx excavatus* is found majorly in soil and it helps in the decomposition of organic matters. They have a long, elongated cylindrical narrow body and is bilaterally symmetrical. The anterior end is tapering and the posterior end is blunt. These Earthworms sizes ranges up to 150mm in length and 3-5 unit in width. These worms are slimy to touch and has glistening dark brown colour which is due to the presence of the pigment porphyrin in its body.

The body of *Perionyx excavatus* consist of about 100-120 small ring like segmentation. *Perionyx excavatus* has a unique and light banding pattern from 13-17 banding position. It can be maintained in Vermicompost and thus used in vermicomposting. Vermicomposting is the efficient method of converting organic wastes into to environment friendly products (Sartaj Ahmad Bhat et al, 2016) [8]. Vermicomposting is an important practice of sustainable remediation which has been used in many countries. The product obtained by this process is called as Vermicompost (Ritu nagar et al, 2017) [7]. Soil fertility depends on physical, chemical and Biological soil attributes. The application of vermicompost affected significantly the pH of the soils but the effects were depending on the strength of different amounts of vermicompost. Increasing amounts of vermicompost produced higher pH values of soil (Chaudhuri PS et al, 2016) [2]. It is a microbiologically active organic material formed from the interactions between earthworms and different types of microorganisms (Dominiguez, 2004) [3]. The Physiochemical properties of feed and environmental factors are known to affect the earthworm growth (Kadam D.G, 2015) [5]. The rates of growth and reproduction of P.e on a variety of organic wastes, were evaluated in these experiments. The time of maturation and the rates of growth of this species, under various population density pressures and temperatures between 15 °C and 30 °C, were also accessed. Increasing temperatures upto 30 °C accelerated the growth of earthworms and lessened the time to Sexual maturity (Edwards CA et al, 1998) [4]. Epigenic earthworms (Oligochaeta) have been appeared as key organisms to convert organic waste resoures into value-added products, i.e, vermicompost and worm biomass (Suthar S, 2009) [12]. In our study the worms were deemed sexually mature when they had fully developed clitellums (Sophie A Viljoen and Reinecke A.J, 1989) [11]. Study was undertaken outdoors as well as indoors of earthworm populations in artificial containers (Reinecke A.J et al, 1992) [6].

Cattle manure is one of the main underutilized resources in most countries. Cattle manure includes dung and urine. Cattle dung generates problem in an environment such as the supply of unpleasant odours

Alcohols are unique group of organic compounds having general formula R – OH where various aromatic groups (benzyl alcohol) or aliphatic groups (methyl alcohol, ethyl alcohol) having alkyl group present in R of the compound. Other types of classification where alcohol may be monohydric, having a single OH or dihydric, having double – OH like glycol, etc... The concentration of the alcohol present in beverages can be determined using Specific gravity method. Drinking alcohol can also increase risk in developing cancers in Human Mouth, esophagus, Throat, liver and Breast. Alcohol can also affect the Brain, Liver, and Heart. (Sophia 2017) [9].

The present study aims to investigate the behavioural changes of *Perionyx excavatus* on the treatment with alcoholic beverages RC & B&W. During this process. The parameters like Burrowing Time, Sedation Time and Killing Time were analysed.

II. Materials & Methods: *Perionyx excavatus* commonly regarded as composting earthworm was collected from Gandhi Krishi Vignana Kendra (GKVK), Agricultural University Bengaluru, Karnataka. The compost used for maintaining and rearing *Perionyx*

excavatus included cow dung and water, The compost was collected from Sri Ramachandra mutt in Girinagar. In the current study, two alcoholic beverages Royal Challenge (RC) and Black & White (B&W) were treated to *Perionyx excavatus*. These beverages were procured from Good luck wines, Netkalappa Circle, Bengaluru. The composition of the RC included Indian grain spirits, scotch malts and a neutral grain spirit derived from molasses. Similarly, the components of B&W include Grain, sour citrus, tiny peat; Light oil, grapes, bananas, vanilla and oak. The morphological study of *Perionyx excavatus* was carried out using a Dissection microscope (Model BE-2) and a Stereozoom microscope (BESTO). The photograph of the earthworms & their behavioural study was captured et a mobile camera.

The parameters considered in the study included to experiment the effect of beverages on The specific gravity of the beverages was investigated to test the effect of *Perionyx excavatus* in its burrowing time, sedation time and killing time. For burrowing time, plastic containers with holes measuring 1.2 kg of 22 cm in length and 10cm in breadth was used. 1 kg of cow dung was filled in each container with different concentrations. Three containers were used for RC and Three for B&W. One Control was kept for recording the normal burrowing time and was compared with the treated. 10 ml of each concentration of treated beverages was applied to one kg of cow dung in the container. To each container, two earthworms were allowed to enter into the media. For sedation and killing time. Five Petridishes were used served as control with three out alcohol and three served as treated with concentration of 5%, 10%, 50% and 100%. The Sedation and Killing time was recorded with a stopwatch on Android phones (Redmi 6 and Realme 8).

III. Observation:

Burrowing Time (BT):

The time taken by *Perionyx excavatus* to enter the soil completely is considered as Burrowing time (BT). *Perionyx excavatus* was treated for both beverages and control was maintained. The data of the Burrowing time of both RC and B&W were recorded at a temperature of 28°C and pH of 8. The three trials at different concentrations of 1%, 2.5%, and 5% of beverage concentration were standardized. Further, it was recorded that the Burrowing time of B&W with treatment RC was at 1%, 2.5% & 5% are 38, 84 and 218 minutes respectively. Similarly, the Burrowing taken B&W at 1%, 2.5% & 5% included 76, 90 and 179 minutes respectively. (Table No 1, Figure No 1)

Sedation Time (ST):

The time required for *Perionyx excavatus* to get anesthetized at a particular concentration is called Sedation Time. The three different concentrations of 5%, 10% and 20% of Alcoholic beverages were prepared and were compared for both Royal Challenge and Black and White. It was found that sedation time taken for RC was 201, 136 and 1 minute 56seconds respectively. Similarly for B&W included .499, 236 and 2minutes 3seconds respectively. This concluded that as the concentration increased the sedation time decreased. But the sedation time under B&W is higher than RC. (Table No 2 Figure No 2)

Killing Time (KT):

The time required for *Perionyx excavatus* to attain its death stage at a particular concentration is known as Killing time. The three different concentrations of 5%, 10% and 20% of alcoholic beverages were prepared and were compared for both Royal Challenge and Black and White Alcoholic beverages. It was found that the killing time taken for RC was 523, 291, 4 minutes respectively. Similarly B&W included 991, 447, and 4 minutes respectively. (Table No 3 Figure No 3)

Specific Gravity (SG):

The two alcoholic beverages RC and B&W were treated to check the time taken by *Perionyx excavatus* the specific gravity and AOAC chart was used to find out the alcoholic concentration in the beverages Specific gravity is defined as the ratio of the density of a substance to the density of a given different materials Hence the formula for Specific Gravity is:

$$W_3 - W_1 / W_2 - W_1 \times \text{Density of water at room temperature}$$

It was found that the specific gravity of both the beverages was determined with the value 47.55% and 47.71% for RC and B&W respectively it has been found that the alcoholic concentration of the B&W was a little higher than RC.

Concentration of Alcoholic beverage		Amount of Alcoholic beverage		Temperature in °C		pH		Burrowing time (minutes)	
RC	B&W	RC	B&W	RC	B&W	RC	B&W	RC	B&W
5%	5%	10	10	28	28	8	8	218	179
2.5%	2.5%	10	10	28	28	8	8	84	90
1%	1%	10	10	28	28	8	8	38	76

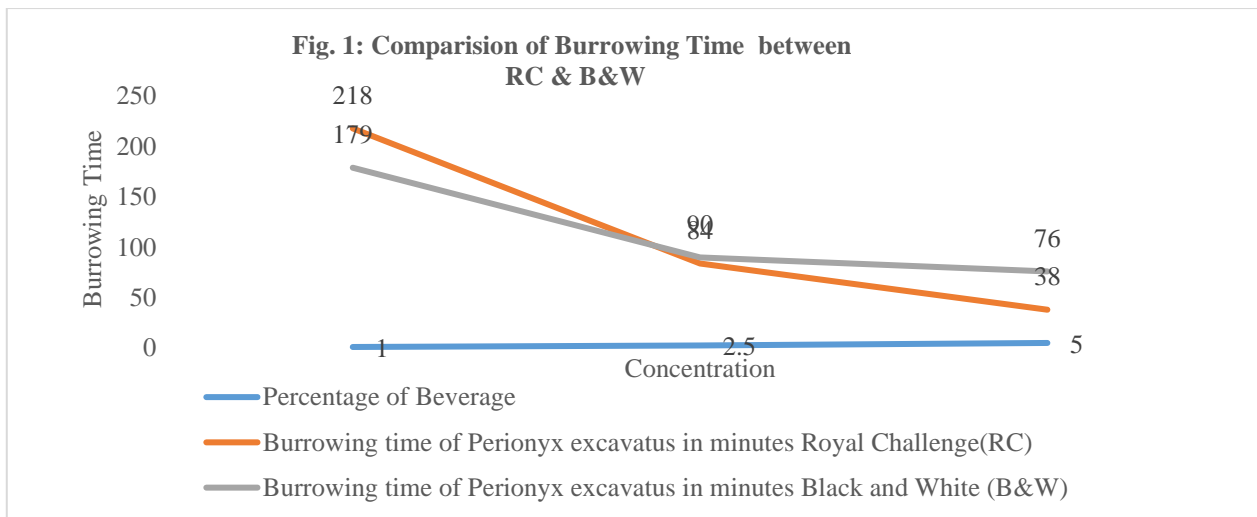


Table 2: Comparison of Sedation time between RC & B&W

Concentration of Alcoholic beverage (%)		Amount of distilled water (mL)		Total dilution (ml)		Sedation Time recorded (minutes)	
RC	B&W	RC	B&W	RC	B&W	RC	B&W
4	4	16	16	20	20	1m	2m
2	2	18	18	20	20	136m	236m
1	1	19	19	20	20	201m	499m

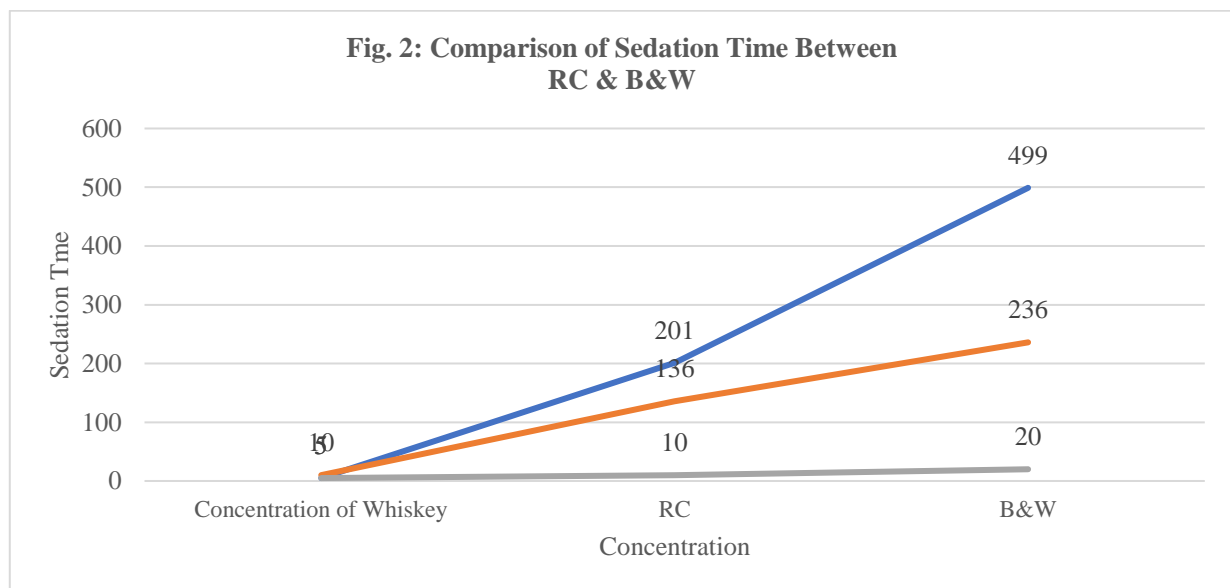


Table 3: Comparison of Killing time between RC and B&W

Concentration of Alcoholic beverage (%)		Amount of distilled water (mL)		Total dilution (ml)		Killing Time recorded (minutes)	
RC	B&W	RC	B&W	RC	B&W	RC	B&W
4	4	16	16	20	20	4m	4m
2	2	18	18	20	20	291m	447m
1	1	19	19	20	20	523m	991m

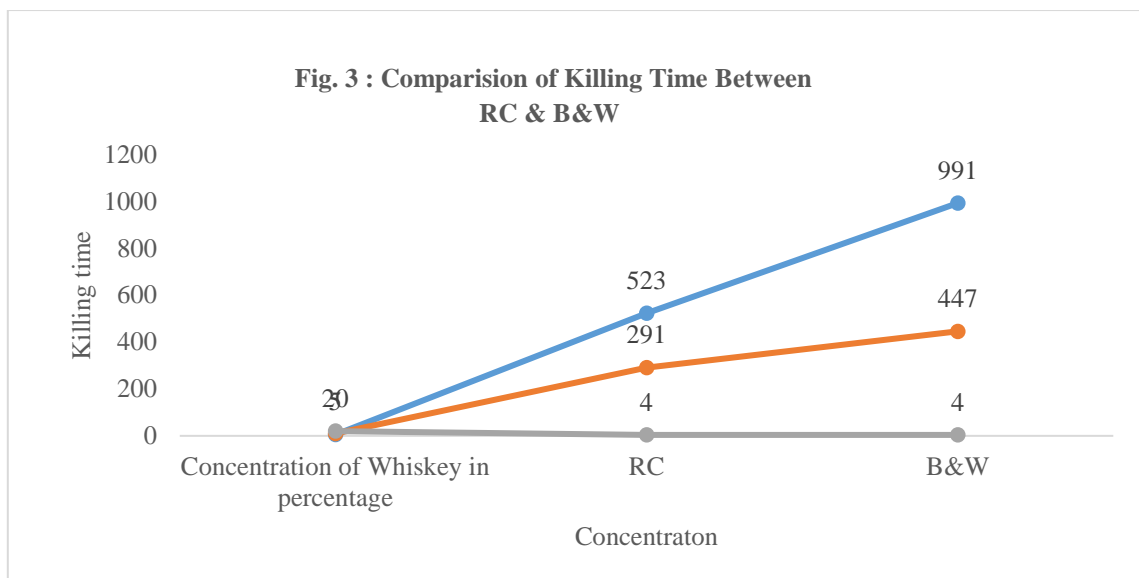


Fig. 4: *Perionyx excavatus*



Fig. 5: Burrowing Time (BT) of *Perionyx excavatus*



Fig. 6: Specific Gravity (SG) Bottle



Fig. 7: Sedation Time (ST) and Killing Time (KT) of *Perionyx excavatus*

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