MATERIALS AND METHODS

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RESULTS

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Preparation of Panchakavya

The ingredients for panchakavya were collected from cow farm at No: 96 Perumal Kovil Street, Sethuppakkam Village, Thiruvallur District, Tamil Nadu, using clean container.

Table-1 Ingredients for the Preparation of Panchakavya

S.No.	Ingredients	Requirements
1	Cow dung	49 Kg
2	Cow ghee	7 Kg
3	Cow urine	70 L
4	Water (running tap water)	70 L
5	Cow milk	21 L
6	Cow curd	14 L
7	Tender coconut water	21 L
8	Jaggery	21 Kg
9	Well ripened poovan banana	85 Nos.

Panchakavya consists of eight ingredients viz. cow dung, cow urine, milk, curd, jaggery, ghee, well ripened poovan banana and tender coconut water (Table 1). Cow dung and cow ghee were mixed thoroughly in a wide mouthed earthen pot and stirred both in the morning and evening for three

days. After 3 d cow urine and water were added, mixed and incubated for 15 d. After 15 d the rest of the ingredients were added and kept in shade for 30 d. The contents were stirred twice a day both in the morning and evening for 15 min. The panchakavya stock solution was ready after 30 d (care should be taken not to mix buffalo products, local breeds of cow is said to have potency then exotic breeds). It should be kept in the shade and covered with a plastic mosquito net to prevent houseflies from laying eggs and the formation of maggots in the solution. Jaggery is dissolved in water and used, while, sugarcane juice is most preferable.

The efficiency of panchakavya could be enhanced by adding various adjuvants. In the present study plants commonly used as bio-pesticides *Vitex negunda, Pongamia pinnatae, Adhatoda vasica,* and *Citrus limon* were mixed in panchakavya and used. The waste from poultry and fishes that contains various nutrients was used. Neem cake, the most widely used bio-pesticide, was used as one of the adjuvants.

Preparation of Panchakavya with Plant Adjuvants

The plants (Table 2) namely *Vitex negunda, Pongamia pinnata, Adhatoda vasica* and *Citrus limon* were collected from local garden of Sethuppakkam village, Thiruvallur district.

Table-2 Ingredients for Panchakavya with Plant Adjuvants

S.No	Ingredients	Requirements
1.	Panchakavya stock solution	50 L
2.	*Vitex negunda*	5 Kg
3.	*Pongamia pinnata*	5 Kg
4.	*Adhatoda vasica*	5 Kg
5.	*Citrus limon*	5 Kg
6.	Running tap water	10 L

The leaves of *Vitex negunda, Pongamia pinnata*, *Adhatoda vasica* and *Citrus limon* were washed in running tap water, cut into 0.5 to 1 cm pieces and taken in a wide-mouthed earthen pot to which 10 L of tap water and 50 L of panchakavya stock solution were added, mixed thoroughly and closed with a lid and allowed to ferment for two weeks. The contents were stirred daily for aeration. After two weeks the panchakavya + plant was ready to be used.

Preparation of Panchakavya with Animal Waste

Animal waste namely chick waste, fish waste, egg shell, and lemon fruits were purchased from Thamaraipakkam Koot Road Market, Thiruvallur district.

Table-3 Ingredients for Panchakavya with Animal Waste

S.No	Ingredients	Requirements
1.	Panchakavya stock solution	50 L
2.	Chick waste	25 Kg
3.	Fish waste	25 Kg
4.	Lemon fruits	50 Nos.
5.	Egg shell	100 Nos.
6.	Running tap water	10 L

The ripened lemon fruits, chicken waste, fish waste (Table 3) were chopped in to small pieces of 0.5 to 1 cm, and the egg shell was crushed and mixed in a wide-mouthed earthen pot. The container was closed with an air tight lid and kept in shade for 10 d, after which 50 L of panchakavya stock solution was added.

Table-4 Ingredients for Panchakavya with Neem Cake

S.No	Ingredients	Requirements
1.	Panchakavya stock solution	50 L
2.	Neem cake	50 Kg
3.	Running tap water	10 L

Preparation of Panchakavya + Neem Cake

Neem cake 50 Kg was mixed with 10L of water in a wide-mouthed earthen pot (Table 4). After 10d, panchakavya stock solution (50 L) was added and kept closed under shade. The content was stirred twice a day both in morning and evening for 15 minutes. After10 d the panchakavya + neem cake stock solution was ready to use.

Vermicompost

Vermicompost was bought from Krishi Vigyan Kendra, Tirur, Tamil Nadu. Vermicompost 1 kg was mixed with 16 L tap water and incubated for 30 d and used.

Synthetic Chemicals and Fertilizer

The Chemicals and fertilizers were purchased from Balaji Traders, Thiruvallur.

Design of the Experiment

Experiment Period	:	2015 to 2017.
Field Area	:	One hectare

Treatments

1.Control	:	Water (No fertilizer or pesticides used)
2.Chemicals and fertilizers	:	Different chemical fertilizers and pesticides are used depending upon the crop.
3.Panchakavya	:	The panchakavya stock was filtered and diluted in the rate of 1:15 (v/v) with water just before spraying.
4.Panchakavya +plants	:	"
5.Panchakavya +animal waste	:	"
6.Panchakavya+ Neem cake	:	"
7.Vermicompost	:	1 kg + 16 L of water

The treatments were sprayed with hand sprayer using high pore size nozzle (2 mm).

Garden Tools and Implements

Hoe, works like a blade, it is pulled by animals. Seed drill, sickle (Aruva), eveler (suhaga), kudali (axe), harrow (dandal) mallot, spade (pharwa), small sickle (daranti), big sickle (darati), big bamboo basket (kitta), winnower (sloop), sieve (chanani), sack bags, tool for collecting pin-needles (miscellaneous tools), cow bar were used. Field was ploughed with tractor.

Seed Collection

Plants selected for the present study (Table 5) were two cereal crops namely Ragi (millet; *Eleusine coracana*) paddy (*Oryza sativa)*, a pulse green gram (*Vigna radiata*) and a green vegetable Roselle (*Hibiscus sabdariffa).*

Table-5 Crop Cultivated During the Study Period

S.No.	Crop	Binomial name	Variety
1.	Ragi	*Eleusine coracana*	Co (Ra)15
2.	Green Gram	*Vigna radiata*	Co7 c1
3.	Rice	*Oryza sativa*	NLR34449
4.	Roselle	*Hibiscus sabdariffa*	local crop cultivar

The seeds were purchased from Periyapalayam Agricultural Society, Thiruvallur, Tamil Nadu. Selection of seeds is the first step in production of quality plants. The seeds free from pest and disease, rotten, dull colored, black spotted seeds were removed. Seeds of uniform size and shape alone were used for sowing.

Germination Frequency and Seedling Vigour Index

The germination frequency of the seeds was tested in all the 7 treatments. Seeds (40 numbers) were soaked in sterile Petriplates lined with filter paper disc and 2 ml of each treatment was added. The seeds were observed for germination every day and the shoot (plumule) and root (radicle) length were measured. On 5^{th} day seedling length was measured and tabulated. The seedling vigour index was calculated adopting the method suggested by Abdul -Baki and Anderson (1973) and expressed as whole number.

Seedling Vigour index = Germination percentage × seedling length.