



Effect of Environmental Parameters on the Treatment of Human Fecal Waste by Black Soldier Fly Larvae

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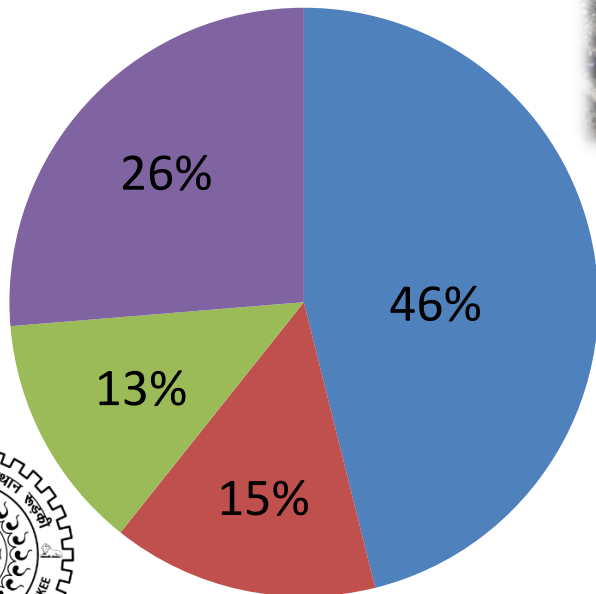
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INTRODUCTION

626 million-
Practising open
defecation in
India.



- septic tanks
- pit latrines
- other latrines
- without latrines



OUR GREEN TECHNOLOGY

**Black Soldier
Fly Larvae
aided
treatment of
human
faeces.**



Methodology

Fat, protein & carbohydrate analysis



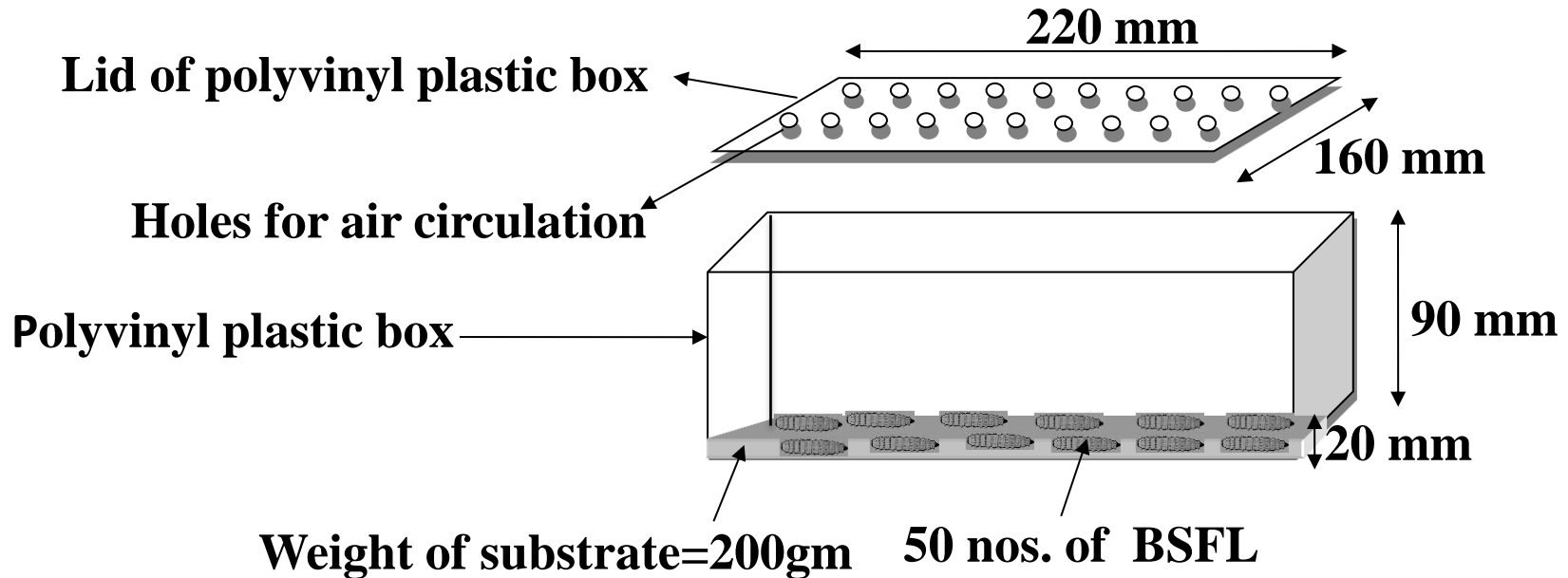
Weighing of larvae in 2 day



EXPERIMENT FOR FS TREATMENT



Experimental framework

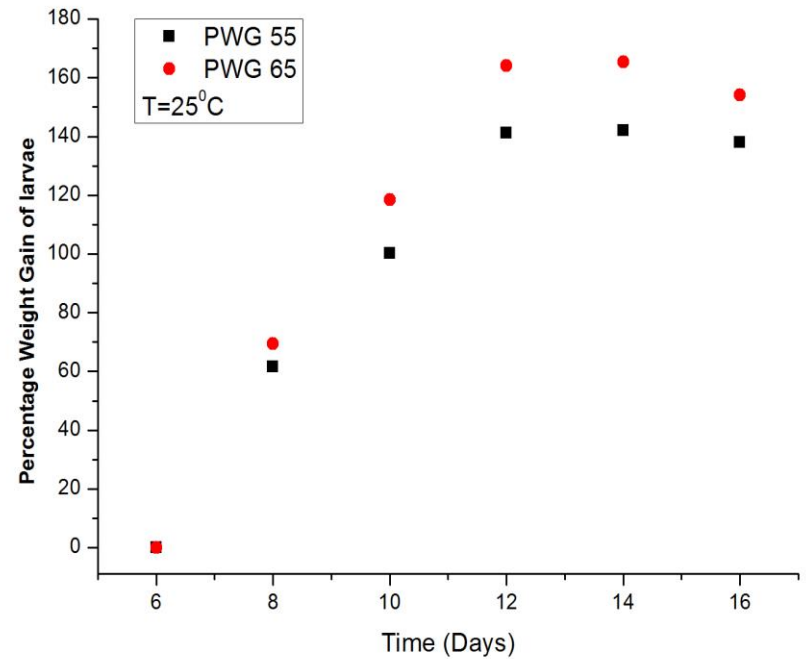
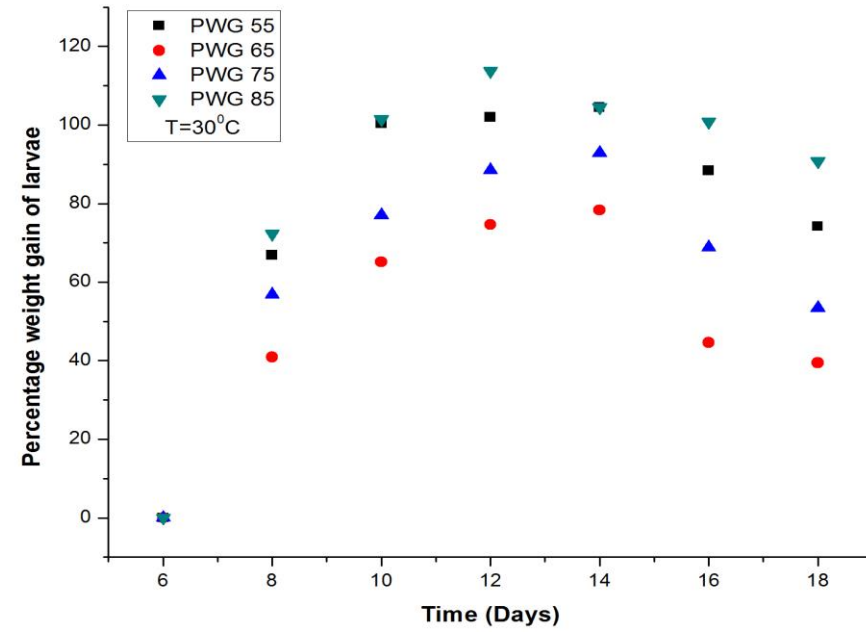


Environmental conditions: Temperature, T=20, 25, 30, 35, 40, 45deg C
Humidity= 55, 65, 75 and 85%



Result

Environmental Conditions	Percentage Weight Gain of Larvae
T= 30 ⁰ C, RH=55%	73.60%
T= 30 ⁰ C, RH=65%	39.60%
T= 30 ⁰ C, RH=75%	53.43%
T= 30 ⁰ C, RH=85%	90.40%
T= 25 ⁰ C, RH=55%	137.95%
T= 25 ⁰ C, RH=65%	154.14%



Result

TEMP.	R.H. (%)	Substrate consumption per larvae (in grams)	Ratio of final to initial weight gain of larvae	Weight Gain (in mg/lv.)	Food conversion ratio (FCR)	Larvae reqd. For 1 Kg of 100% human waste reduction
25°C	55	0.7513	2.379	71.325	6.096	1332 (2038)
	65	0.7279	2.541	74.550	5.891	1380 (2258)
30°C	55	1.0935	1.742	46.832	24.653	922 (1673)
	65	1.4058	1.395	32.453	45.642	712 (1570)
	75	1.2364	1.534	43.110	28.670	817 (1577)
	85	0.7189	1.908	58.929	13.388	1402 (1748)



Discussion

- **Growth rate plasticity** indicates that BSFL could be capable of consuming pit material with a range of nutritional contents and still has the capability of developing into valuable prepupae.
- The feeding of BSFL = **0.70-1.5 g/lv**
- The FCR value ranges from **6.0-46.0**. The optimum around 25°C.

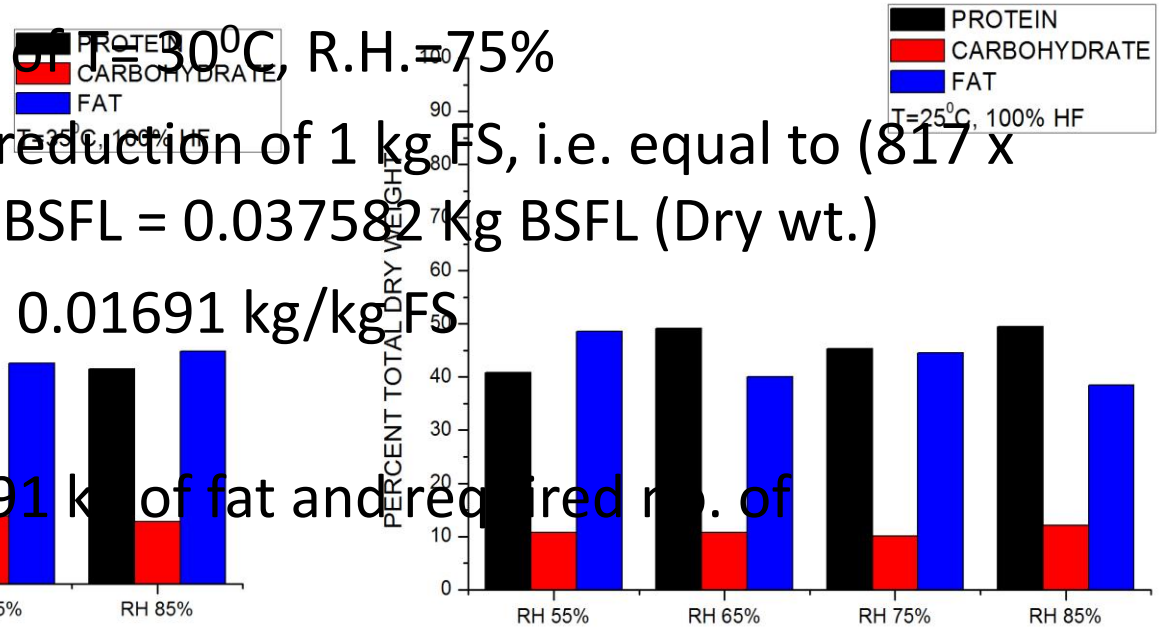


Discussion

- If we assume 45% of fat content in a BSFL total body weight.

- Then, for e.g. in case of $T=30^{\circ}\text{C}$, R.H.=75%
- 817 Nos. of BSFL for reduction of 1 kg FS, i.e. equal to $(817 \times 0.115) = 0.093955 \text{ kg BSFL} = 0.037582 \text{ Kg BSFL (Dry wt.)}$

- Total fat production = 0.01691 kg/kg FS
- For 1 quintal FS = 1691 kg of fat and required no. of BSFL = 81700



- On an average each BSF egg cluster leads to around 700 hatched neonate larvae.
- Reqd. no. of egg clusters = 120 approx.



Summary

- ☺ BSFL technology for FS treatment has a huge potential.
- ☺ Converts FS into value added products in the form of protein and fat.
- ☺ The feeding of BSFL = 700-1500 mg/lv
- ☺ Great growth rate plasticity is great!



Challenges

- The greatest challenge in this entire technology is successful artificial rearing of these flies.
- We are still dependent on the natural wild BSF for getting constant supply of larvae and are still learning.



SETUP NO. 1



SETUP NO. 2



SETUP NO. 3



SETUP NO. 3



SET UP NO. 4





Lets switch to a greener globe



DEPARTMENT OF BIOTECHNOLOGY
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BILL & MELINDA
GATES foundation

Swachh Bharat



एक कदम स्वच्छता की ओर



Thank you
Prayer, Love, Gratitude
Symphony of Love



Where there's a will
there's a way.