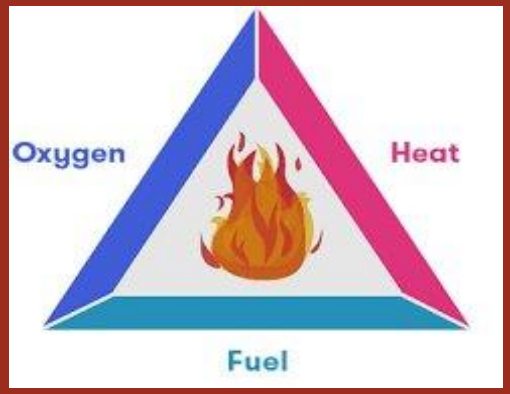
Ignis
Fructus
Fire Starting Capsules
From Dried Plants

BACKGROUND RESEARCH



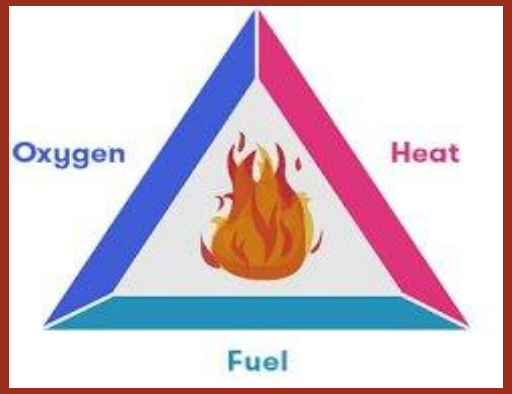
What makes fire?

A fire is a creation of three key components heat, fuel and a chemical reaction to start a fire.

What are fire capsules?

Fire starting capsules typically contain a powerful chemical accelerant or finely ground flammable material to help ignite kindling quickly.

BACKGROUND RESEARCH



What is Buffelgrass?

Buffel grass is an invasive plant that comes from Africa. It has small hairy flowers in its plant.

What is Rice Husk?

Rice husk is the shield part of the rice when it grows and can be seen when the rice is harvested and the husk is removed.

RESEARCH GOALS

GOAL 1

Make fire capsules using buffelgrass and rice husk.

GOAL 2

Test different buffelgrass and rice husk ratios

STATEMENT OF THE PROBLEM

1. How does increasing the percentage of rice husk influence the ignition time of the fire-starter tablets?
2. Which biomass ratio produces the fastest self-sustained flame?

VARIABLES

INDEPENDENT

Buffelgrass, Rice Husk ratio

DEPENDENT

Time to light up the capsule

CONSTANTS

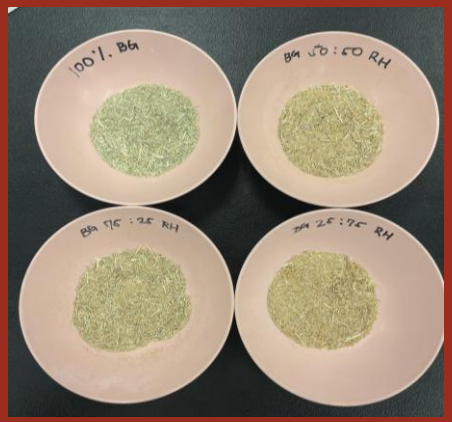
Jar, Bowls, Fire

HYPOTHESIS

If the ratio of buffel grass to rice husk in fire-starter capsules is increased, then the burn time will increase, because buffel grass is denser and burns more slowly than rice husk.

METHODS

STEP 1 : Dry and turn the buffelgrass and rice husk into powder completely. Then Weigh the correct amount of biomass based on the chosen mix.



STEP 2 : Make homemade glue by mixing corn startch and water, then mix it with the biomass. Stir until mixture clumps together.

METHODS

STEP 3 : Create the capsules by pressing the mixture firmly into the mold for 1 minute.

STEP 4 : Remove and dry tablets at 60- 70 c for 3-4 hours or air- dry for 2-3 days. Record final dry mass before testing.

RESULTS

TRIAL 1

TRIAL 2

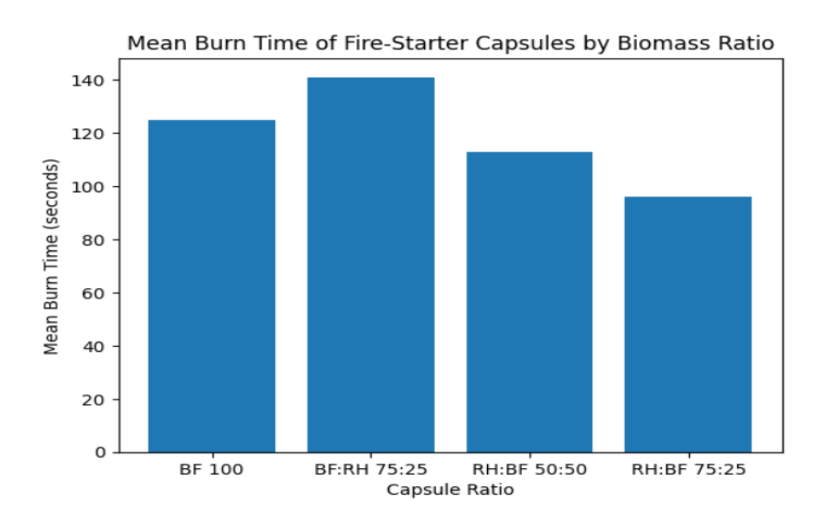
TRIAL 3

RESULTS

RATIO AND MEAN TIME

Ratio	Mean Time (s)	Mean Time (min:sec
BF 100	125 s	2:05
BF:RH 75:25	141 s	2:21
RH:BF 50:50	113 s	1:53
RH:BF 75:25	96 s	1:36

MEAN BURN TIME AND BIOMASS RATIO



DISCUSSION

Capsules with **75% buffel grass and 25% rice husk** burned the longest because buffel grass burns slowly while rice husk improves airflow, creating a balanced and efficient fire starter.

CONCLUSION

This experiment showed that fire-starter performance depends on the proportion of buffelgrass and rice husk used. Capsules with a higher buffelgrass content burned longer, while increasing rice husk content reduced burn time. The results suggest that controlling biomass composition is important for designing efficient fire starters and that invasive buffel grass and agricultural waste rice husk can be repurposed into practical, low-cost fuel materials.

REFERENCES

- https://www.usgs.gov/faqs/what-buffelgrass
- http://www.knowledgebank.irri.org/step-by-step-production/postharvest/rice-by-products/rice-husk#:~:text=Fig.,cogeneration%20system%20to%20produce%20electricity
- https://www.nps.gov/articles/wildlandfire-facts-fuel-heat-oxygen.htm
- **Energy Kids – Biomass Energy** https://www.eia.gov/kids/energy-sources/biomass/
- **FAO (Food and Agriculture Organization) – Rice Husks (Simplified Reading)** https://www.fao.org/energy