

Objectives

- ❖ Assess and establish natural biomass cattail (*Typha latifolia*) fibre block, as substrate for use in aeroponic systems.
- ❖ Assess the performance of natural fibres compared to synthetic material which are non-biodegradable.

Research Problem

- ❖ There is insecurity of supply of vegetables in Northern regions of Canada because of transportation cost and adverse weather.
- ❖ Growth media for aeroponic system, Rockwool, is not readily available in Northern areas.

Prospects of Cattail Fibre as Substrate

- ❖ The production of rock wool (one m³) involves an average energy demand of 275 KWh and 167 kg CO₂ released to the environment and causing 150 m³ of waste per hectare per year in landfills (Dennis et al. 2015).
- ❖ Cattail plants are known as nutrient absorber and accumulator in aquatic environment (Grosshans et al. 2011).

Materials

Fibre Block Preparation



Figure 1: Cattail plant, fibre and blocks

- ❖ Cattail fibre extraction starts in a water-bath at 90°C temperature, 5% KOH solution.
- ❖ Fibres were washed rigorously followed by a neutralization process.
- ❖ The dried fibres were cut and tied with a cotton cord to the desired sizes for use as growth media.

Methodology

Seed Germination Stage



Figure 2: Rock wool

Figure 3: Fibre blocks

Three types of plants (arugula, lettuce and tomato) were set for germination in rock wool and fibre block. In both cases, 21 tomato, 18 lettuce, 18 arugula seeds were used.

Transplant Plants in Aeroponic System

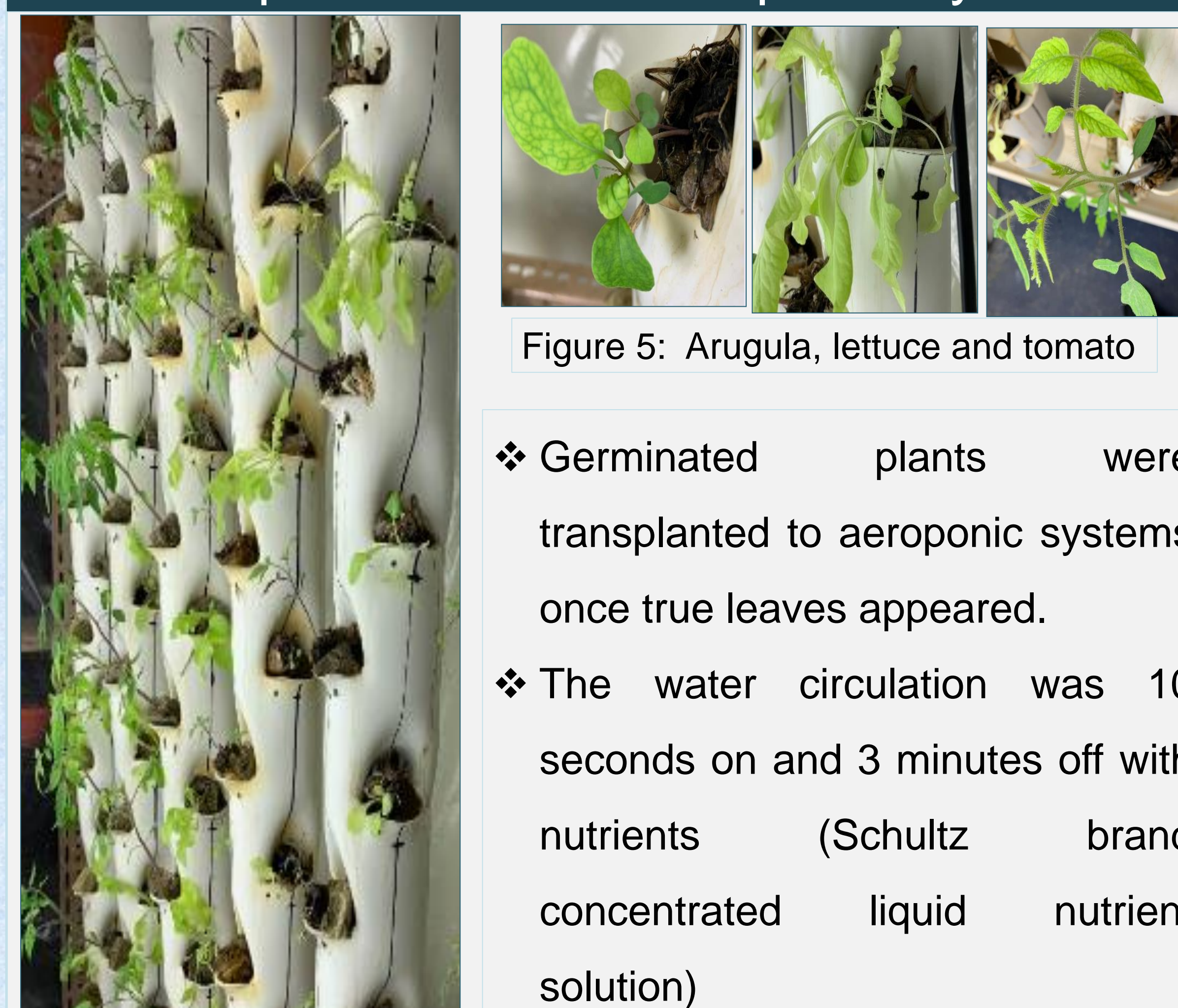
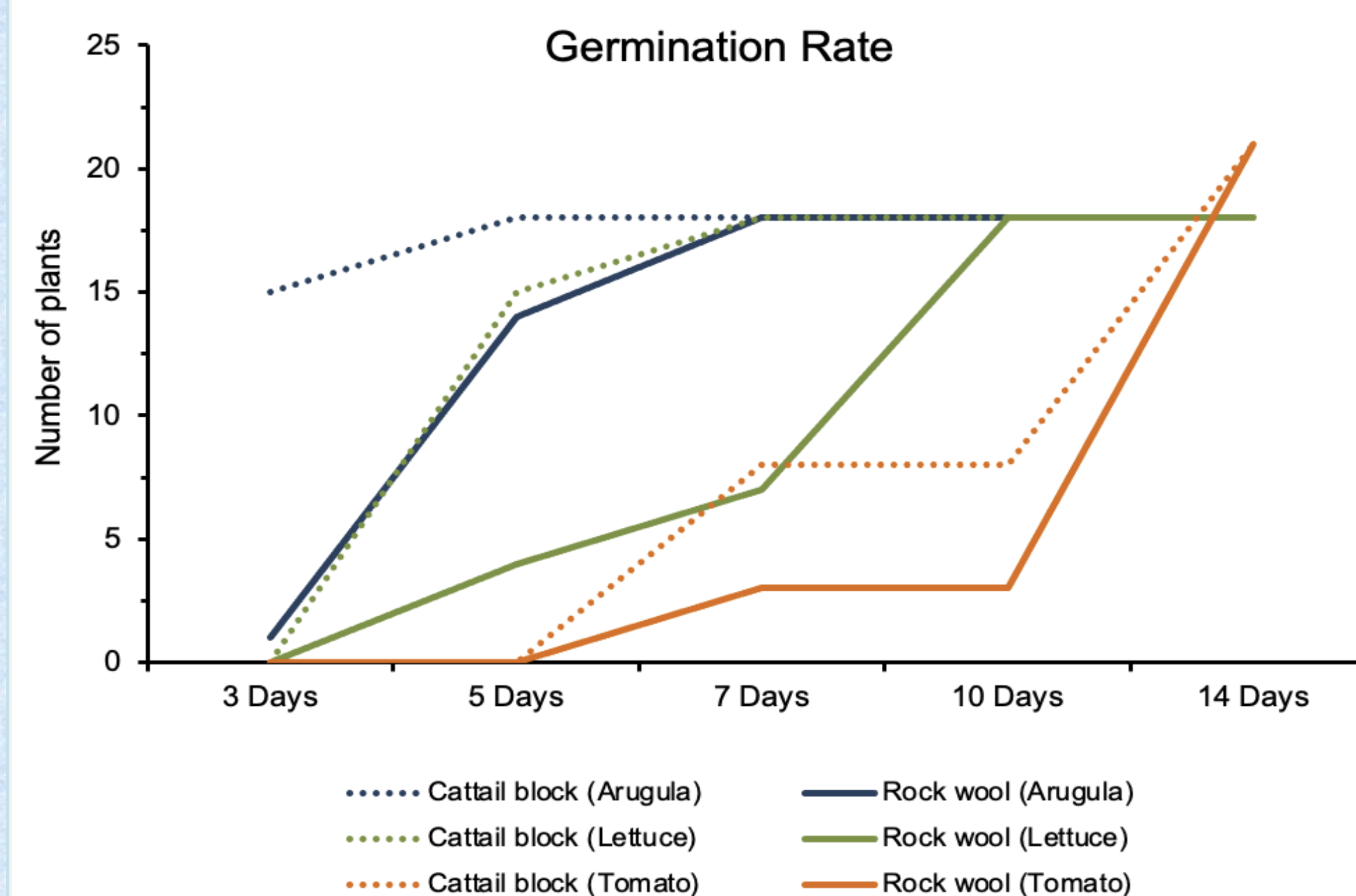


Figure 5: Arugula, lettuce and tomato

- ❖ Germinated plants were transplanted to aeroponic systems once true leaves appeared.
- ❖ The water circulation was 10 seconds on and 3 minutes off with nutrients (Schultz brand concentrated liquid nutrient solution)

Figure 4: Aeroponic system

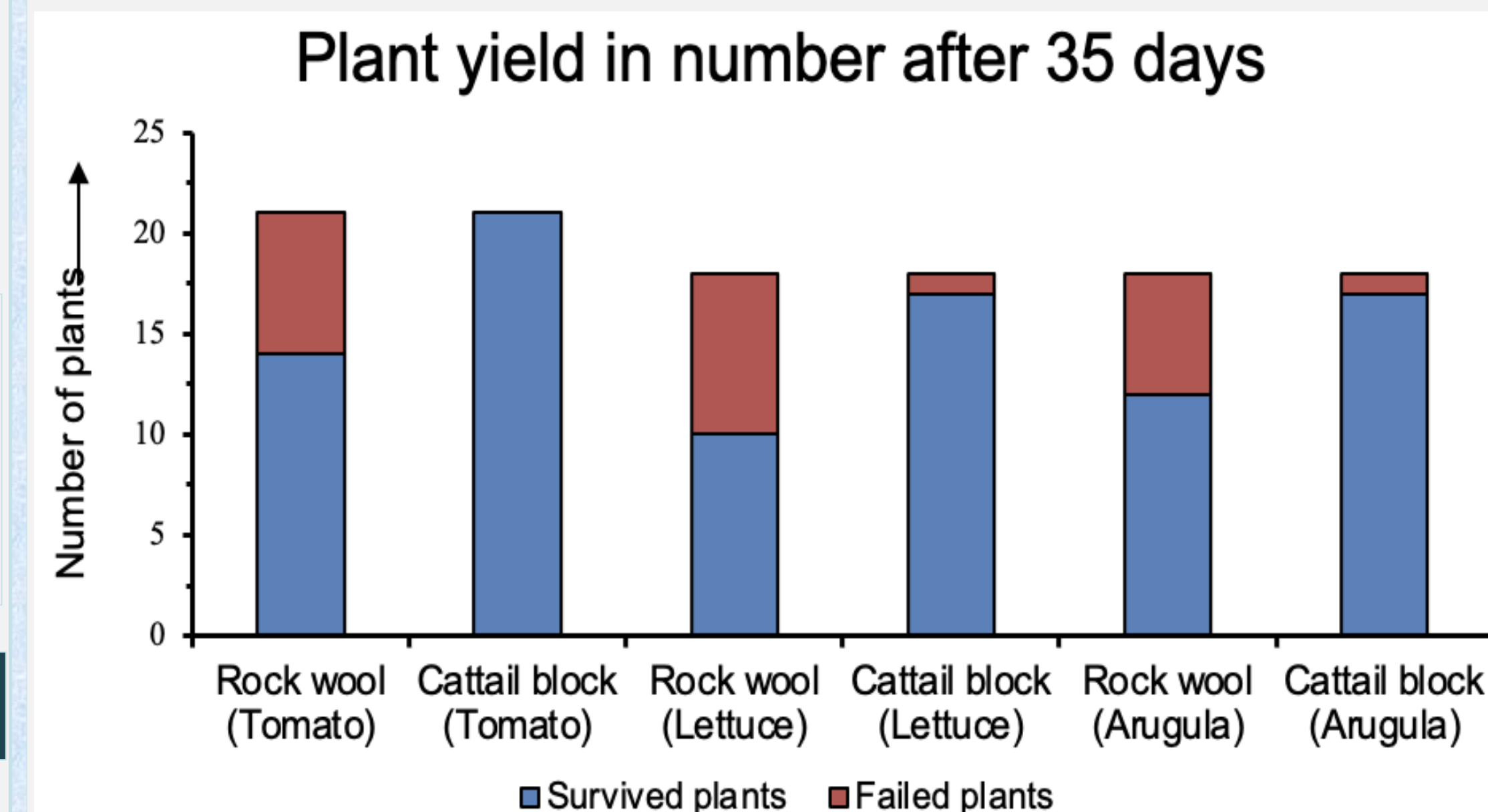
Results During Germination



Conclusions

The experimental data depicts that cattail fibre block is a prominent material to be used as substrate for vegetation in aeroponic systems in Northern areas.

Results for Plant Yield



- ❖ During germination cattail fibre block showed better performance for arugula (3 days), lettuce (5 days) and tomato seeds (7 days).
- ❖ All the seeds were germinated in fibre blocks in case of arugula in 5 days and for lettuce in 7 days whereas for rock wool takes 7 and 10 days, respectively.
- ❖ Plant yield was greater for cattail fibre blocks after 35 days of maturity.
- ❖ Plants survived in rock wool were 66.67, 55.56 and 66.67% for arugula, lettuce and tomato respectively while for cattail fibre block the percentages were 94.44, 94.44 and 100%.

Acknowledgements

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References

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