Sustainable Rifamycin B Production from Agro-Waste through Solid State Fermentation using *Amycolatopsis mediterranei* MTTC 14 bacteria, Aligned with COP28 Objectives

Supervisor: Dr Sameh Soliman
Students: Samira Alkharsah, Hibatullah Ahmed, Hanin Zakia, Wiaam Karima
College of Pharmacy, University of Sharjah

Current situation

Rifamycin has antibiotic activity against mycobacteria causing tuberculosis and leprosy, as well as against retroviral infections associated with AIDS. There is high demand on rifamycin for human therapy.

Rifamycin B is produced by submerged fermentation using Peanut meal, Soybean Meal, dextrose, and fish meal as substrates for the inoculum *Amycolatopsis mediterranei* and under specific parameters.

The production of rifamycin B is not carried out in the most sustainable manner, and it can be relatively an expensive process.

Objectives

Search for more sustainable methods of production of rifamycin B that:

1. Produces higher yields of Rifamycin B
2. Is more cost-effective and economical
3. Creates a symbiotic link between agro-waste producers and pharmaceutical industries.

Available Data

Studies have shown that in solid-state fermentation utilizing *A. mediterranei* on ragi bran and deoiled cotton seed cake, was successfully obtained 197 grams of rifamycin SV per kilogram of dry substrate. This achievement is presented as 20 grams per kilogram of dry substrate, representing one of the highest quantities of rifamycin SV produced and reported to date in comparison to earlier publications. Whereas other studies also showed increased production of Rifamycin when Various oil cakes such as coconut oil cake (COC) and groundnut oil cake (GOC) were used, and the use of SSF while optimizing its key parameters combined with agro-industrial residues has been proven as a feasible approach for the production of Rifamycin B.

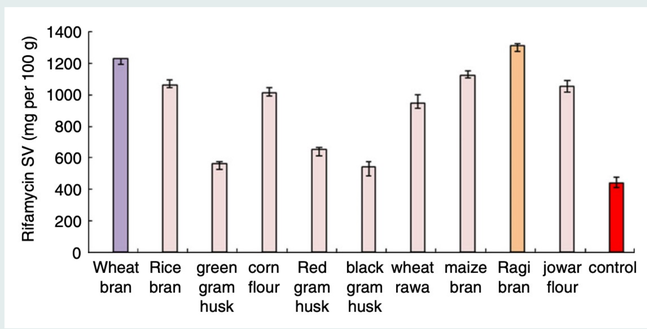


Figure.1 [1]

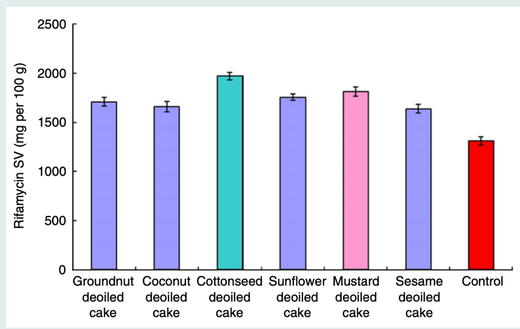


Figure.2 [1]

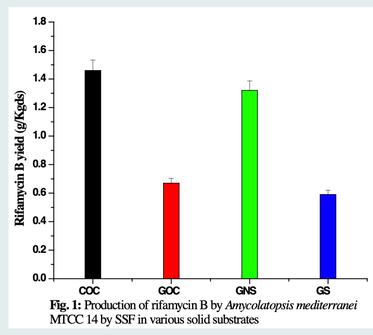


Fig. 1: Production of rifamycin B by *Amycolatopsis mediterranei* MTCC 14 by SSF in various solid substrates

Figure.3 [2]

Research Question

Does the use of Agro-waste as substrates through SSF using *Amycolatopsis mediterranei* achieve a sustainable pathway of production for Rifamycin B aligned with COP28 objectives?

Conclusion

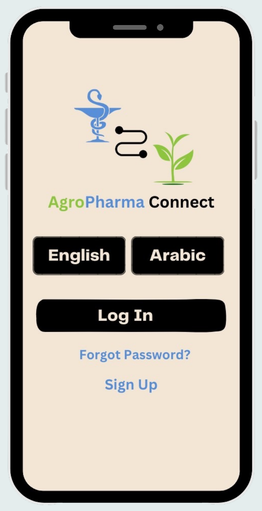
Incorporating Agro-waste will enhance the sustainability of Rifamycin production which aligns with COP28 objectives.

The utilization of solid-state fermentation represents a more sustainable and environment friendly production approach.

Agro-waste and SSF demonstrate cost-effectiveness compared to conventional production methods.

Sustainable methods resulted in increased Rifamycin yields.

Establishing a mutually beneficial connection between two major industries contributes to a valuable circular economy model.



Suggestion for an Innovative & Sustainable App: AgroPharma Connect

1. Connects agro-waste producers with pharmaceutical industries
2. Streamlines communication for efficient collaboration
3. Enhances visibility through geolocation features
4. Builds trust with user profiles and verification
5. Tracks environmental impact with data analytics
6. Provides legal and environmental compliance resources

References

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3. "Rifamycins - Infectious Diseases." MSD Manual Professional Edition, www.msdmanuals.com/professional/infectious-diseases/bacteria-and-antibacterial-drugs/rifamycins.
4. Nagavalli, M., et al. "Enhanced Rifamycin SV Production by Submerged Fermentation Using Amycolatopsis Mediterranei." Applied Microbiology and Biotechnology, vol. 99, no. 18, 31 May 2015, pp. 7505–7513, https://doi.org/10.1007/s00253-015-6682-2. Accessed 3 Jan. 2024..