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Plant-Based Expression of Foot-and-Mouth Disease Virus Serotype O Antigens in *Nicotiana tabacum* for Livestock Vaccine Development

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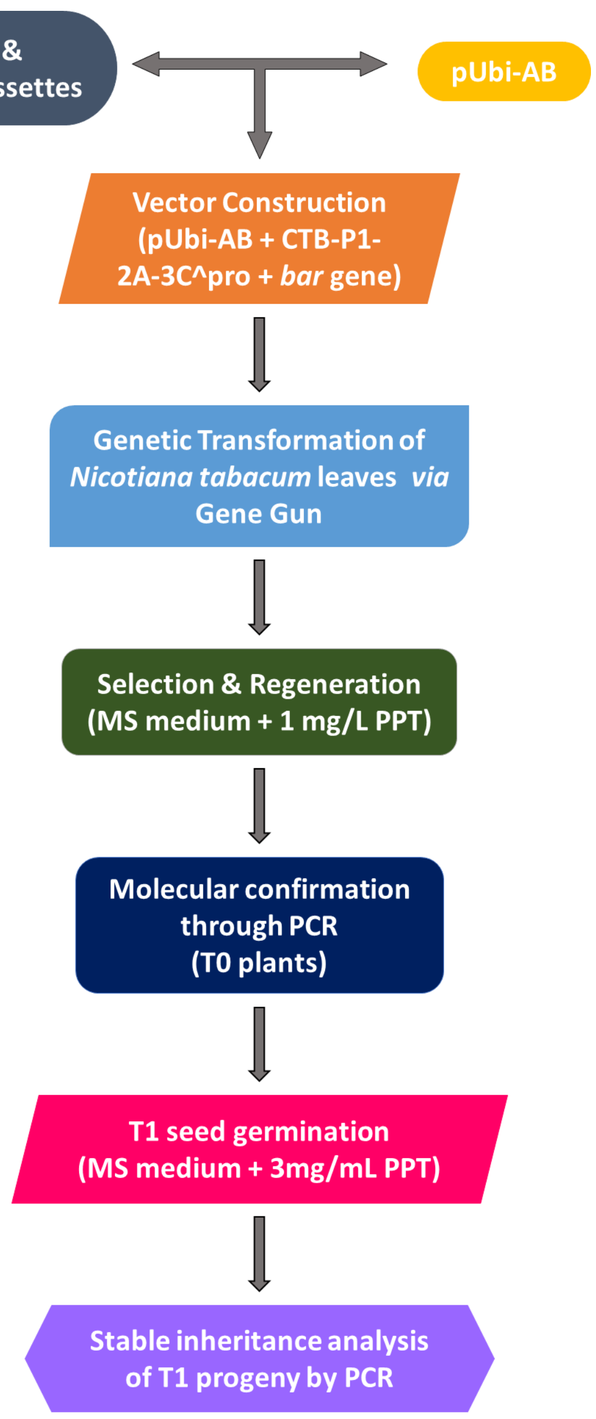
INTRODUCTION & AIM

INTRODUCTION: Livestock is vital to Pakistan's agricultural economy, but it faces a persistent threat from Foot-and-Mouth Disease (FMD). This highly contagious viral disease causes significant economic losses due to recurrent outbreaks. The conventional inactivated virus vaccines used currently have critical limitations, including risk of escape from production facilities, stringent cold-chain requirements and inability to differentiate infected from vaccinated animals (DIVA incompatibility). Serotype O is the most prevalent FMDV serotype which is responsible for majority of global outbreaks. Plant-based expression systems offer a promising alternative. This platform is cost-effective, highly scalable, bio-safe, free from human and animal pathogens and can potentially eliminate the need for a cold chain.

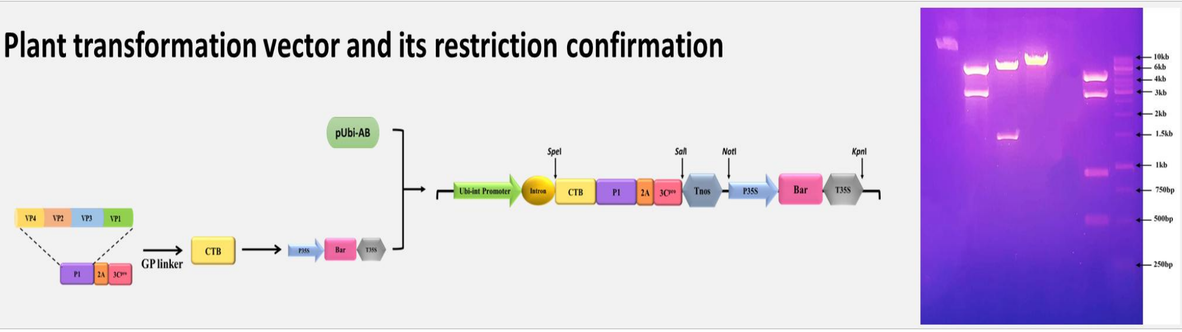
AIM: This study aims to develop a novel subunit vaccine candidate against FMDV serotype O by engineering *Nicotiana tabacum* to function as a bio-factory to produce specific viral antigenic proteins.

METHOD

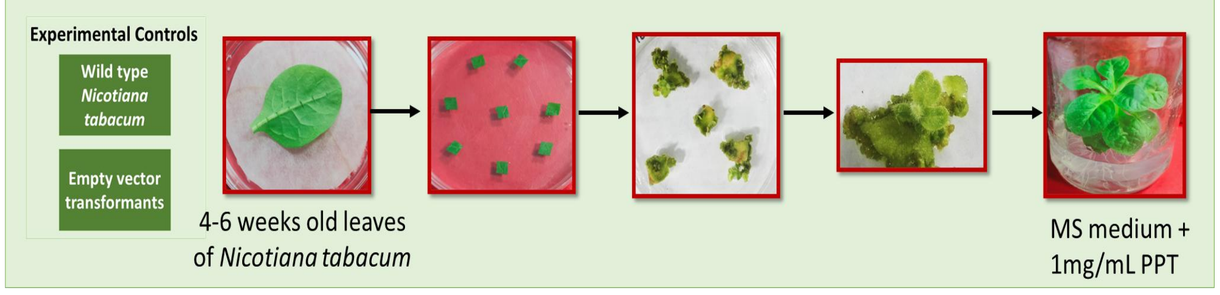


RESULTS & DISCUSSION

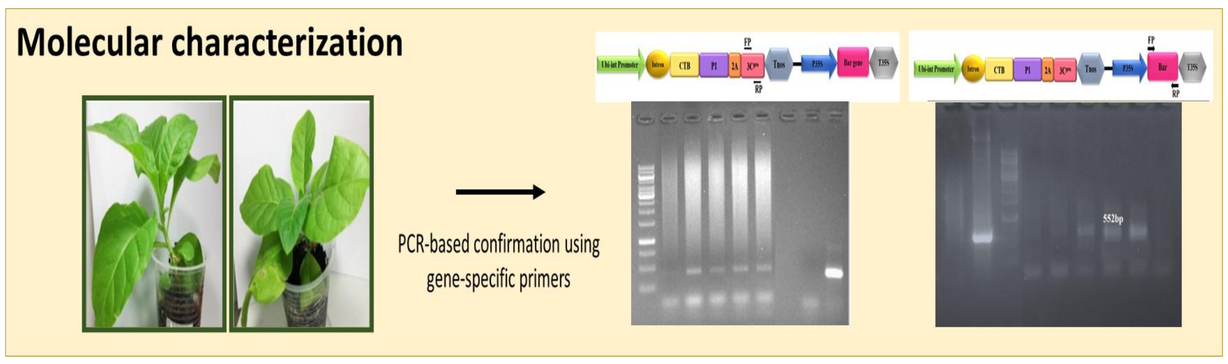
Plant transformation vector and its restriction confirmation



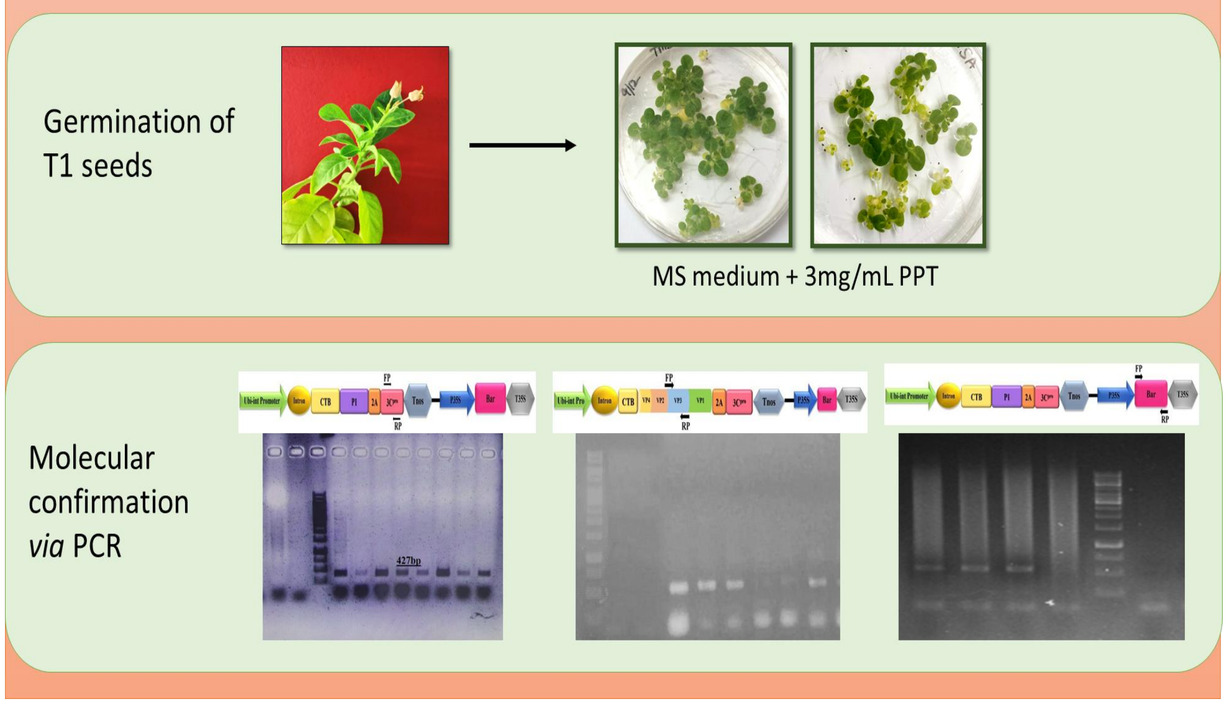
Recovery of Putative Transgenic Plants under Selective Pressure



Molecular characterization



Stable Inheritance of Transgene in the T1 Progeny



CONCLUSION

This study successfully established genetically stable transgenic tobacco lines expressing a key FMDV antigen. Molecular analyses confirmed transgene integration and stable inheritance, providing a critical proof-of-concept and a reliable platform for downstream immunological testing as a cost-effective vaccine strategy.

FUTURE WORK

- Southern blot analysis to confirm transgene integration and determine copy number in selected tobacco lines.
- Verification of antigen expression and size via Western blot analysis.
- Extension of the genetic engineering strategy to a relevant fodder crop.
- Utilization of this plant-made antigen platform for future immunization and challenge studies in the target livestock.