TECHNOLOGY OFFER

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Prevention of unwanted proteolysis in plants

Recombinant proteins like monoclonal antibodies (mAbs), hormones, growth factors and lysosomal enzymes hold great promise as therapeutic agents against a variety of human diseases. In recent years plants have gained increasing attention as versatile platforms for the production of recombinant therapeutic proteins.

BACKGROUND

Recent advances in the development of transient expression systems have placed *Nicotiana benthamiana* in a particularly favorable position since this tobacco-related plant species is well suited for the rapid large-scale synthesis of vaccines and mAbs. Nevertheless, a major problem encountered with recombinant protein production in *Nicotiana* remains to be solved: the proteolytic degradation of the respective target protein within the plants or during harvesting, either of which negatively affects both product yield and quality. Possible approaches for the elimination of such unwanted proteolytic events include the targeted disruption of protease genes, the co-expression of protease inhibitors or the down-regulation of endogenous protease activities by means of RNA interference or other antisense-based mechanisms. The genetic and biochemical characterization of the proteolytic landscape in *N. benthamiana* tissues is still in its early stages. In particular, the proteases accounting for the degradation of heterologously expressed recombinant proteins have not been identified in any plant-based expression system so far, thus currently prohibiting directed approaches to tackle unwanted proteolysis in *N. benthamiana* and related plant species.

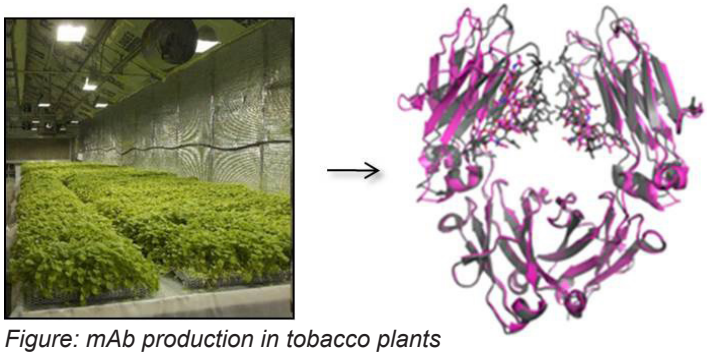

Figure: mAb production in tobacco plants

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Our group has demonstrated that the expression of human anti-HIV mAbs and other biopharmaceutical proteins in *N. benthamiana* leaves leads to their inactivation due to limited proteolysis. We have now identified two *N. benthamiana* serine proteases capable of performing these cleavage events as well as inhibitors that can be used to control the activities of these enzymes.

BENEFITS

- Optimized therapeutic efficiency
- Improved *N. benthamiana* production system through the inhibition of the degradation of the respective target proteins.
- The technology allows the production of complex proteins with superior activity and homogeneity.

REFERENCE:
2018-04

AVAILABLE FOR:
- License Agreement
- Cooperation

APPLICATIONS:
- Recombinant mAbs and other proteins for therapeutic use
- Vaccines against e.g. Influenza, Poliomyelitis or HIV-1 (based on virus-like particles)

KEYWORDS:
Proteolysis, serine protease, post-translational modifications, recombinant proteins

DEVELOPMENT STATUS:
Proof of Concept

IPR:
WO2020070197

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