

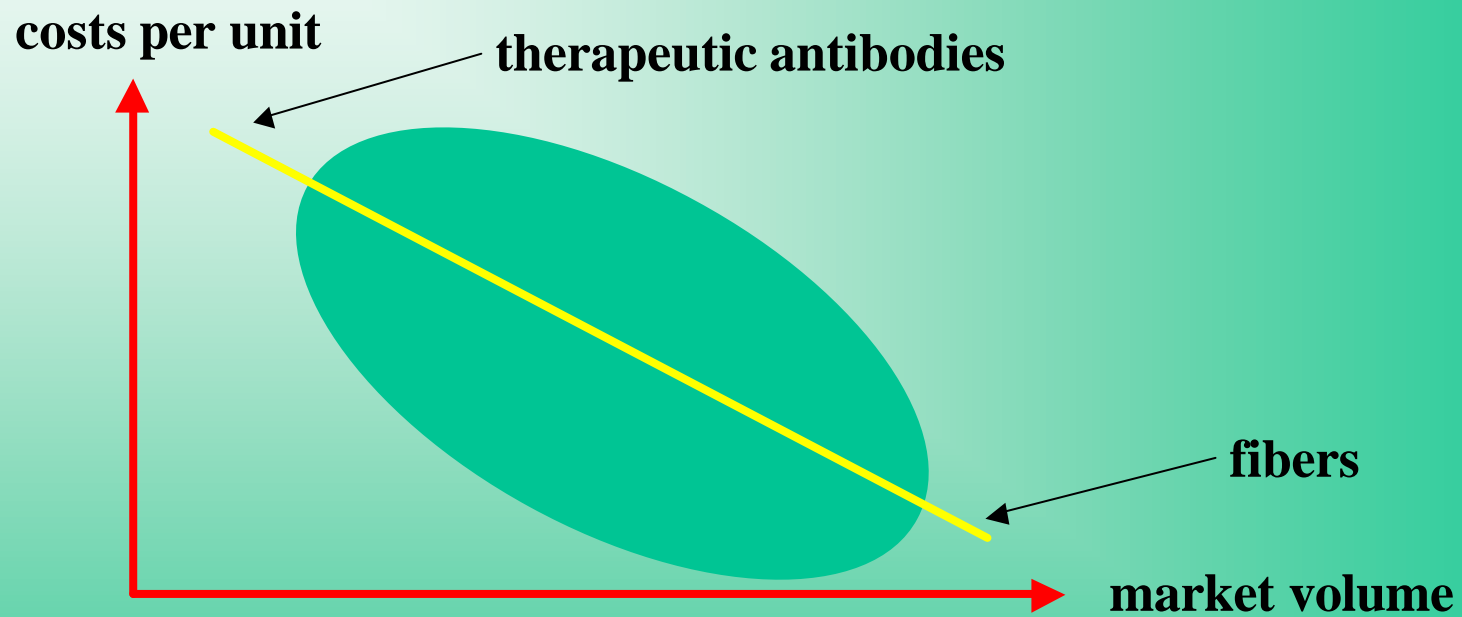
Systems for Molecular Farming

Udo Conrad, IPK Gatersleben



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- **Production of spider silk proteins in plants**
 - **Production of recombinant antibodies in plant seeds**

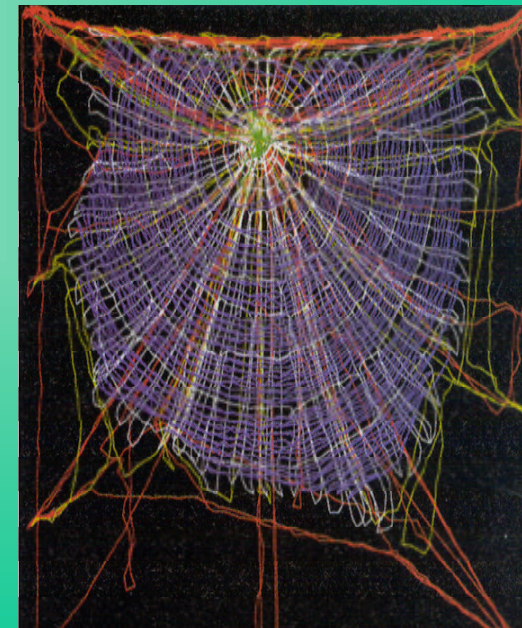
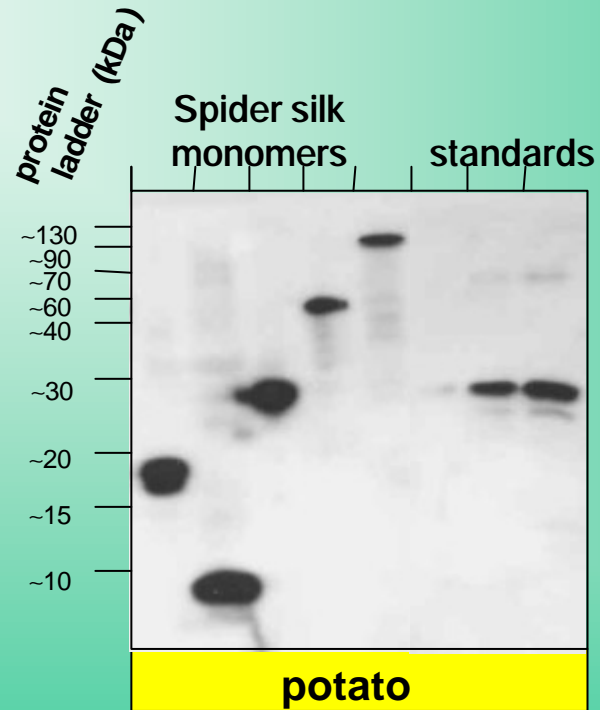
Types of products in biofarming



Spider silk proteins in transgenic plants



● Production of transgenic plants



● Biochemical analysis and purification by heat and salt precipitaton

Expression of spidroin-ELP-fusion proteins in the ER of transgenic plants

ELP - Elastin Like Polypeptide
Oligomeres of the pentapeptide -Val-Pro-Gly-Xaa-Gly-

Properties of temperature sensitive peptides:

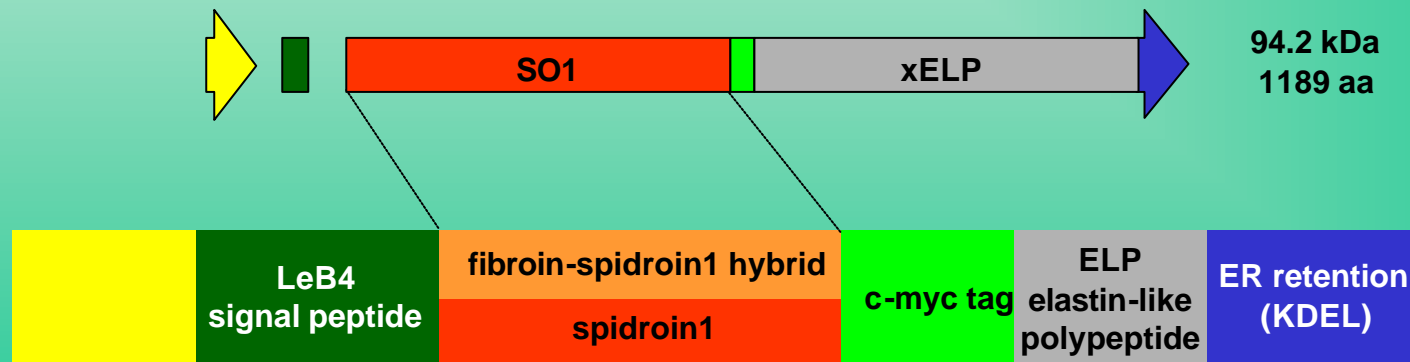
insoluble under T_t
(inverse transition
temperature)

2-3°C
↔
reversible

insoluble above T_t
(inverse transition
temperature)



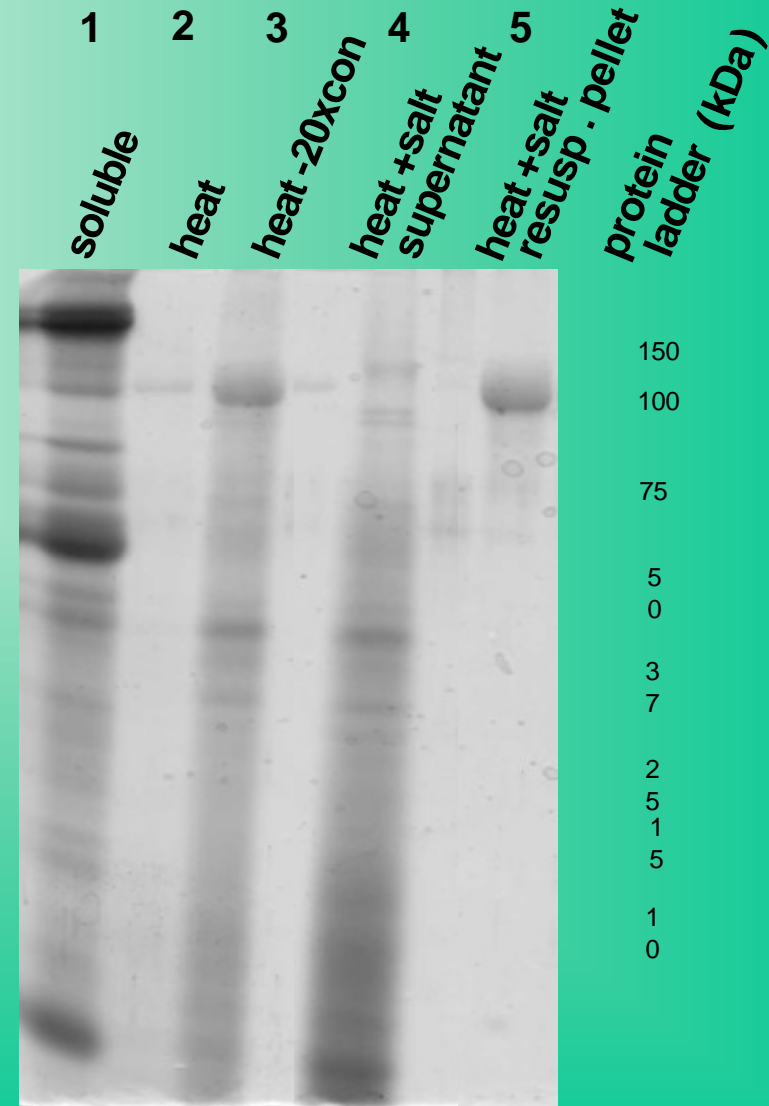
reversible desolvation, aggregation
and prezipitation



ELP's have high homology to the spider silk gene Flag

Purification of spider silk-ELP fusion proteins from transgenic plants

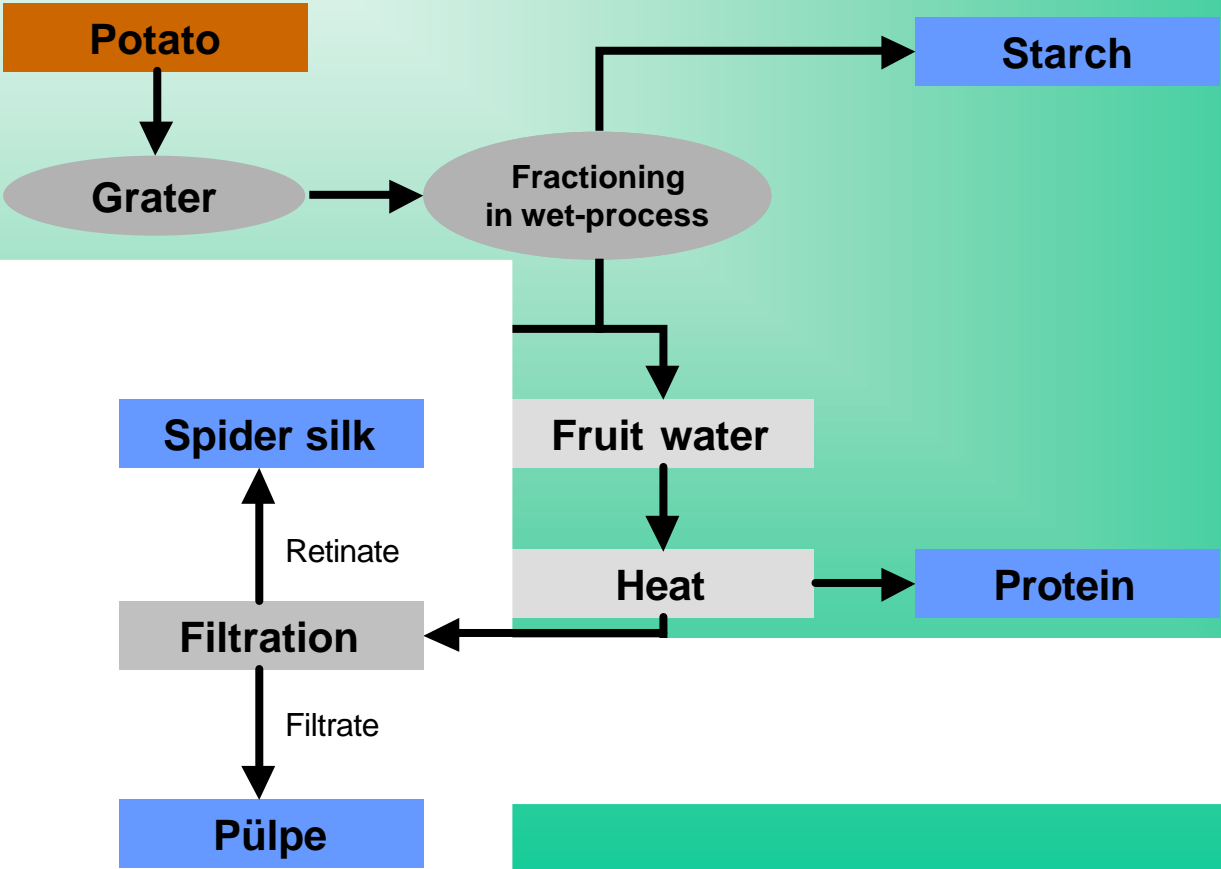
- Spidroin-ELP-fusions could be purified by addition of salt and by heat to 95% purity.



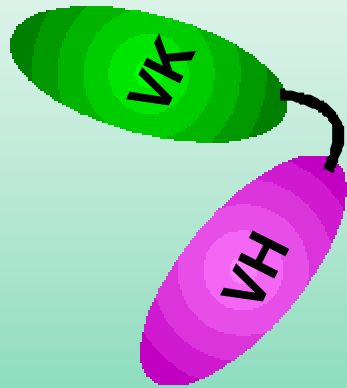
Production form



potato - spider silk proteins
as by-product of
starch production



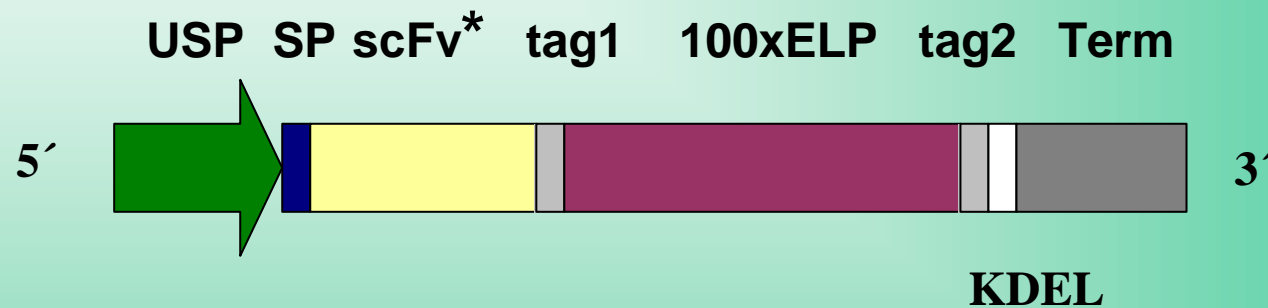
Expression of recombinant antibodies in transgenic plants



single chain Fv antibodies:

- **specific scFv with high affinity available from phage display libraries**
- **accumulation in different compartments of plant cells and in different organs to high concentrations**

Expression of scFv-ELP fusions in plant seeds

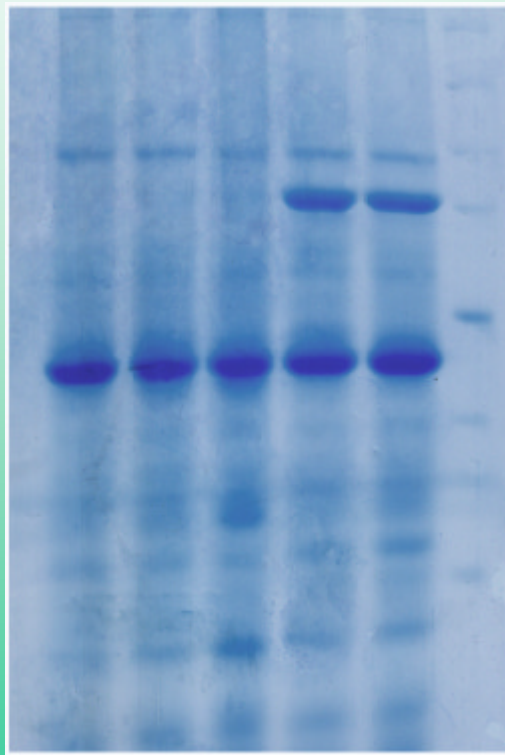


 Production of transgenic tobacco plants

*anti-fungicide scFv

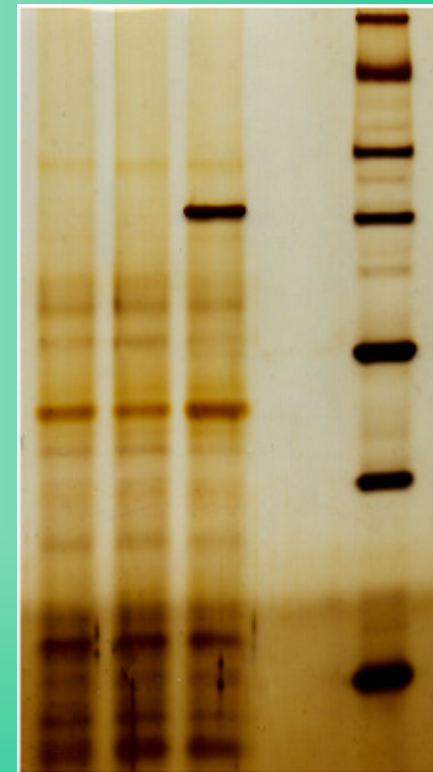
Accumulation of ELP-scFv fusions in plant seeds to high concentrations

WT UB UB UB-ELP M



Coomassie stain

WT UB UB-ELP M



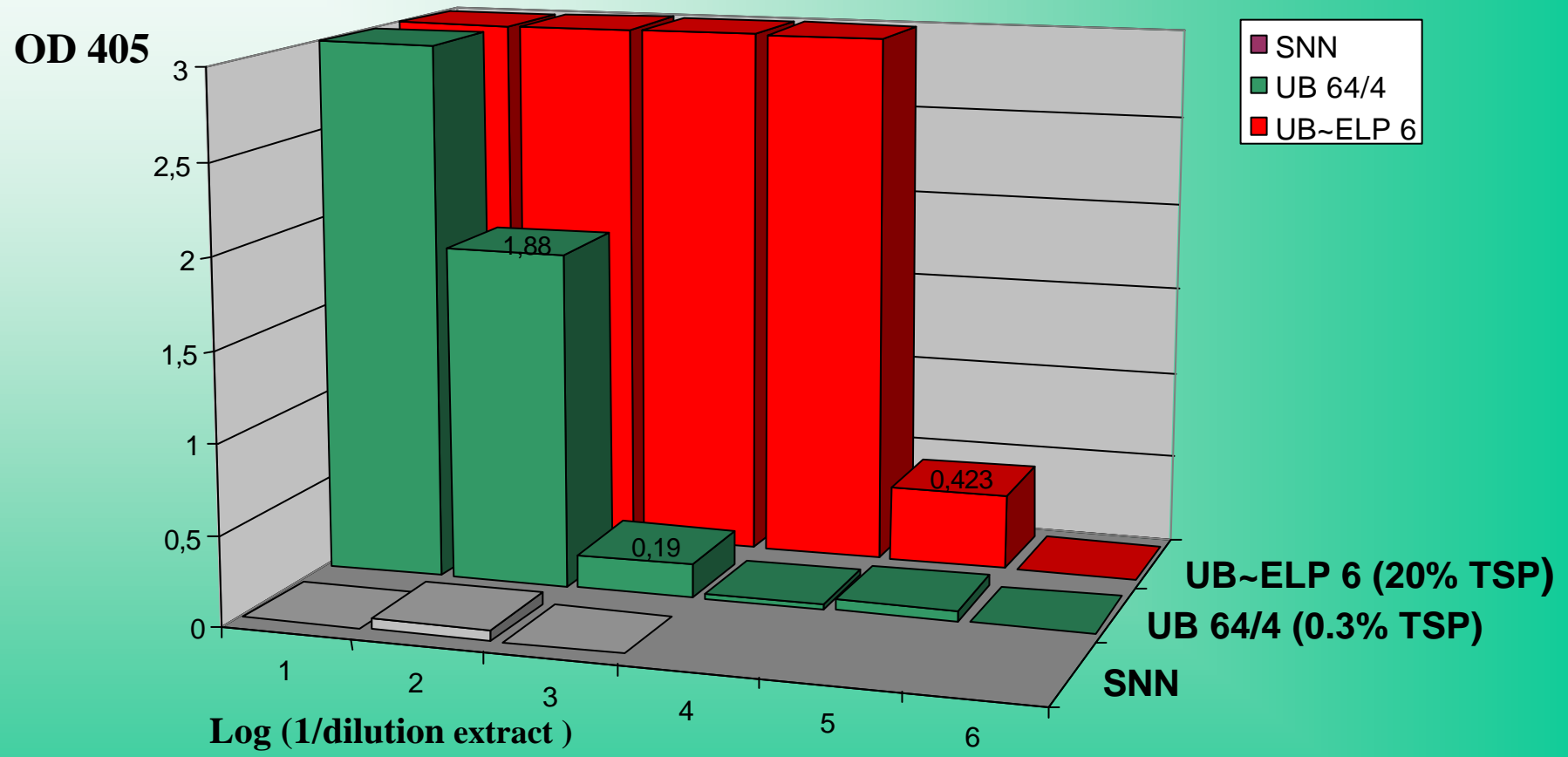
Silver stain

← scFv-ELP fusion protein →

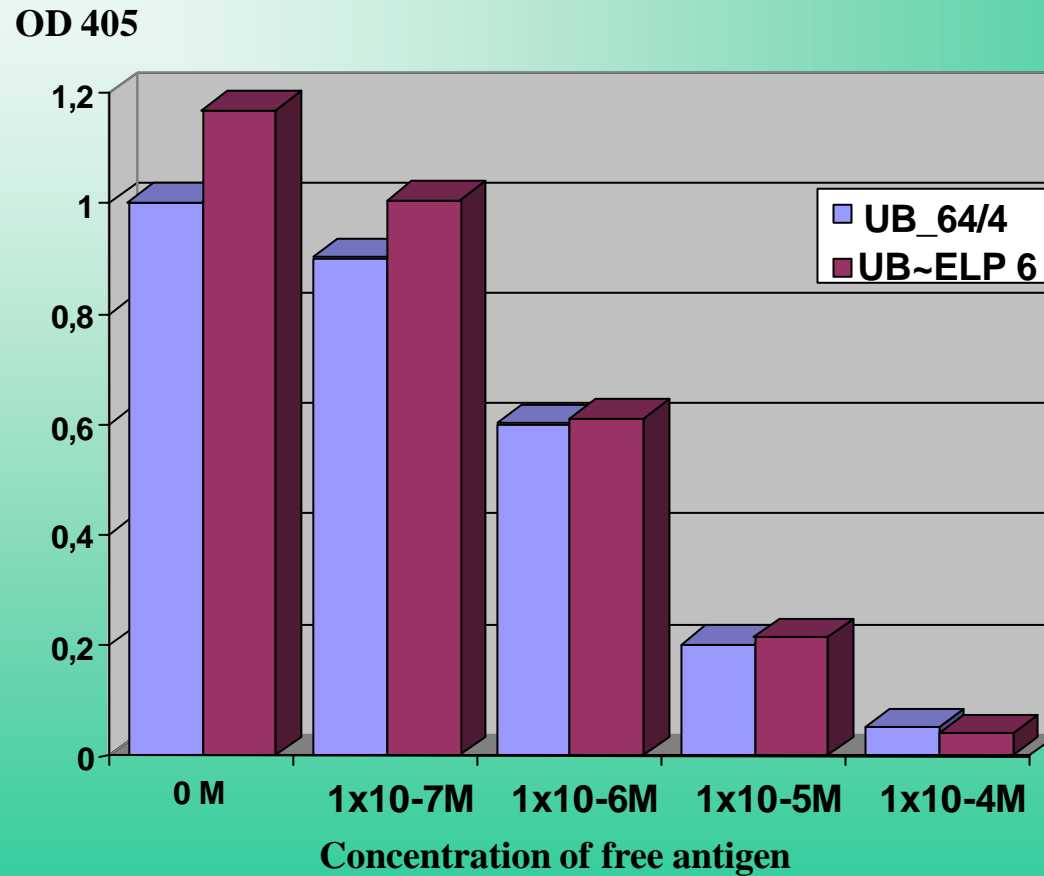
Accumulation of ELP-scFv fusions in tobacco seeds to high concentrations

construct	Kan-resistant plants	scFv expressing plants	min.	max.	mean
UB-ELP	14	9	~15% TSP	~20% TSP	~17% TSP

ScFv-ELP fusion proteins from seeds are highly active in ELISA



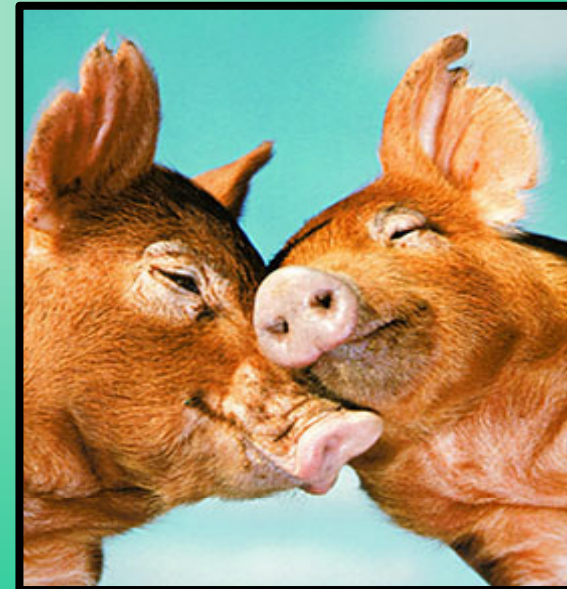
ScFv-ELP fusion proteins and scFv show identical binding behaviour in competitive ELISA



Production system and further experiments

● Proof for other promoters → GABI

● Proof for crop plants → GABI



Acknowledgements

**Members of the phytoantibody group at IPK,
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