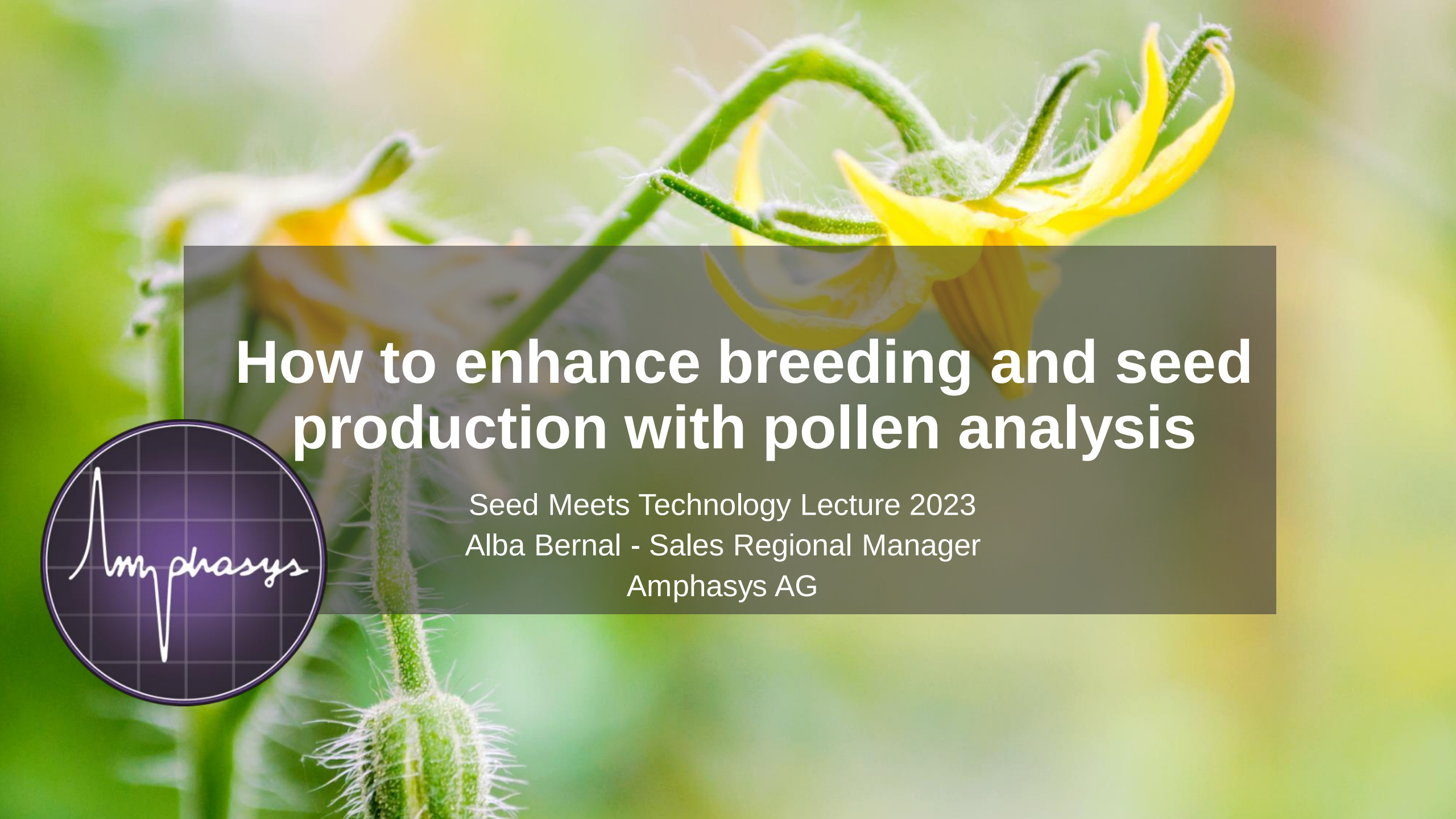


How to enhance breeding and seed production with pollen analysis

Seed Meets Technology Lecture 2023

Alba Bernal - Sales Regional Manager
Amphasys AG

Amphasys

- Experts in single-cell analysis
- 10 years of Pollen Analysis - Addressing challenges of the seed industry
- Innovative pollen analysis solutions

FAST, HIGHLY ACCURATE and RELIABLE

So why pollen?

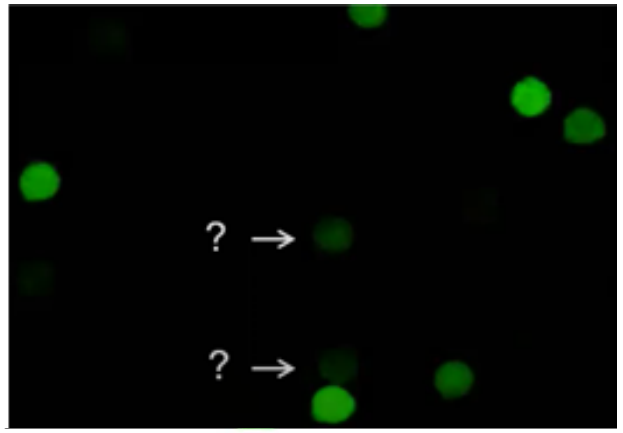
«Pollen is the main matter that transports genetic information»

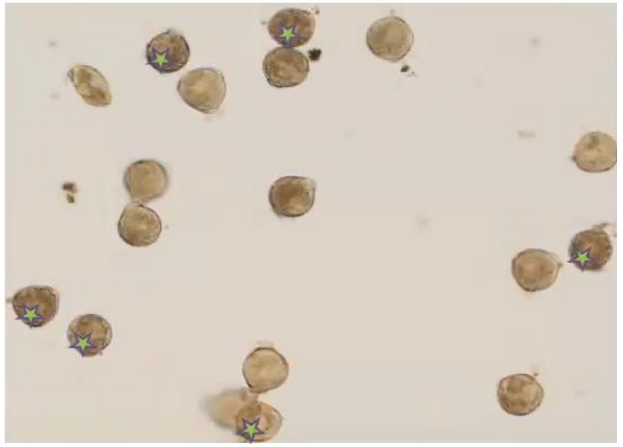
«Pollen is the most important matter that ensures a high seed set»

Analytical Traditional Methods

Staining Techniques and Germination Essays

- Complex, time-consuming sample preparation and data analysis
- Low throughput (sample/hour) and reliability
- Pollen species restrictive

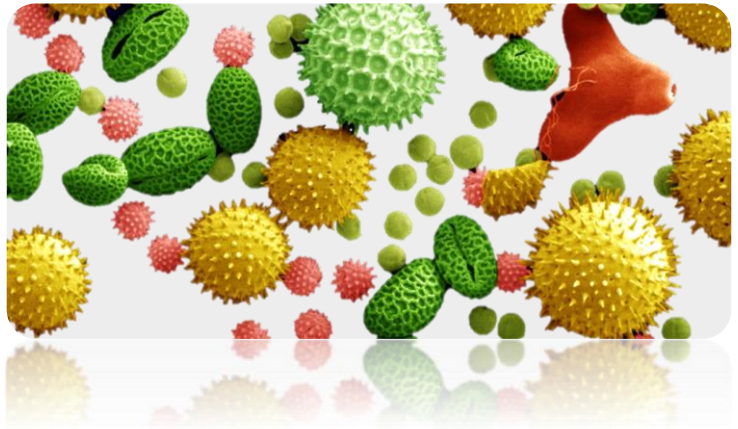




LIMITATIONS TO BE IMPLEMENTED AS A ROUTINE CHECKING

The Amphasys Advantage

- Fast and simple measurements within seconds
- Large sample size for accurate results
- Consistent, location-independent measurements

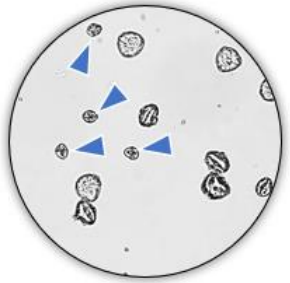


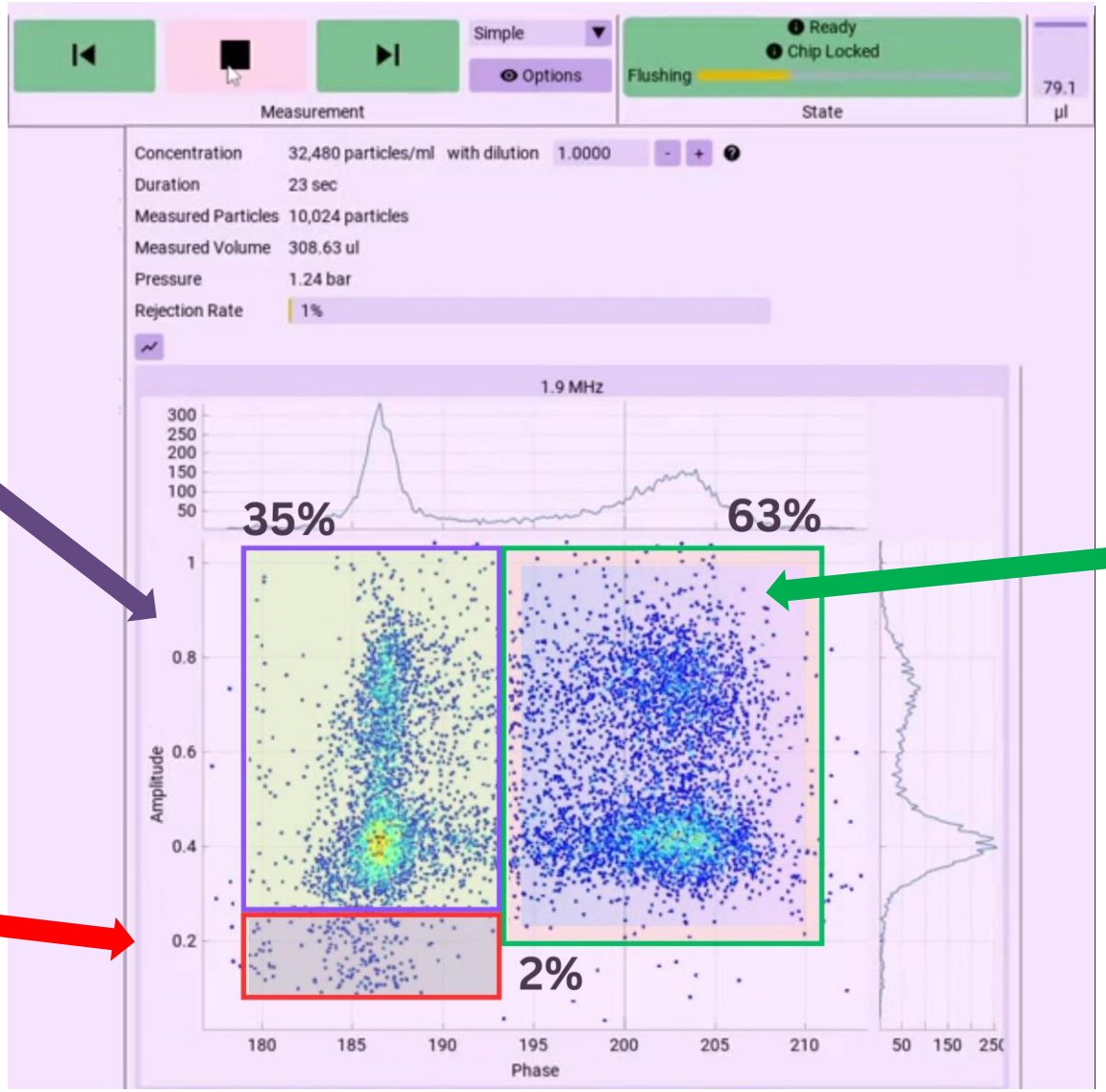
UNIVERSAL AND STANDARDIZED METHOD

How does it actually work?

Dead

Aberrant





Viable

Where do we see the Benefits of Pollen Analysis?

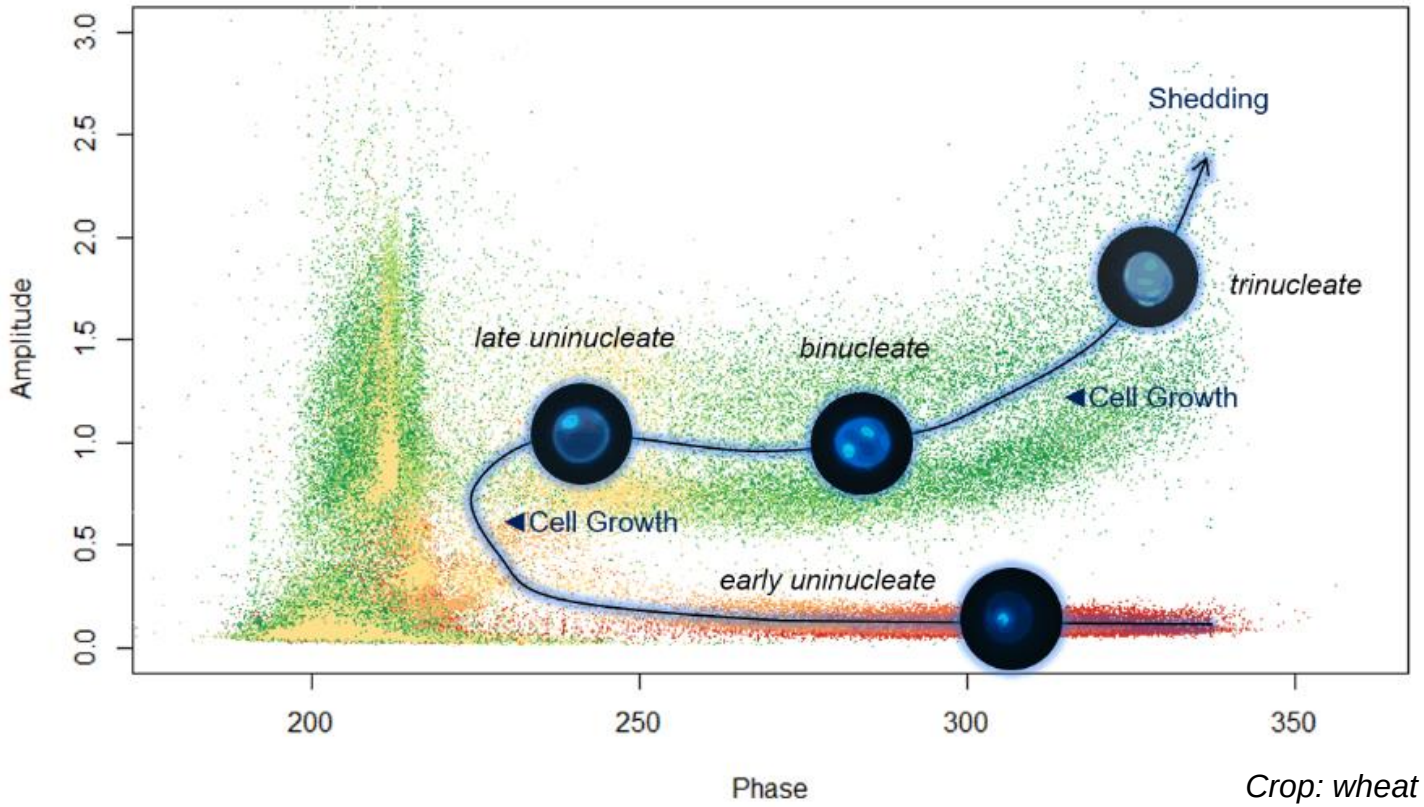
Increase Reliability

Reduce Costs

Increase efficiency

Efficiency Increase: Double Haploids

- Right microspore developmental stage
- Determine the treatment efficiency (viability)
- Early embryo yield prediction

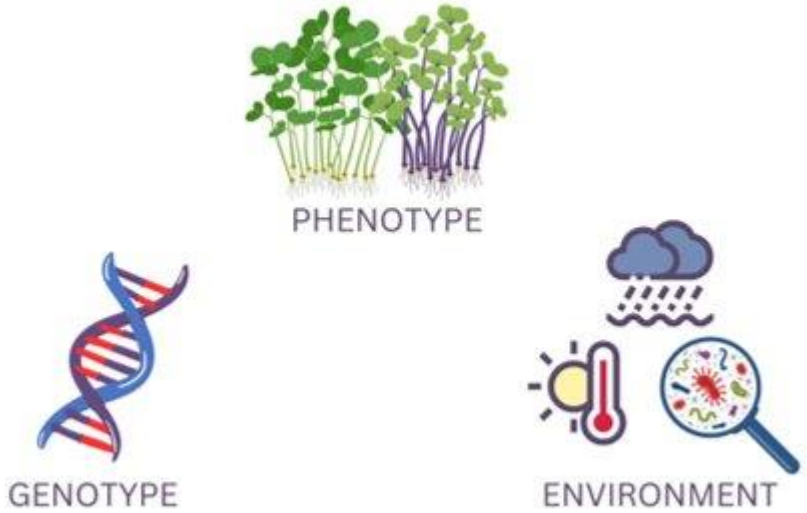


Crop: wheat

EFFICIENT STREAMLINED DH PRODUCTION PROCESS

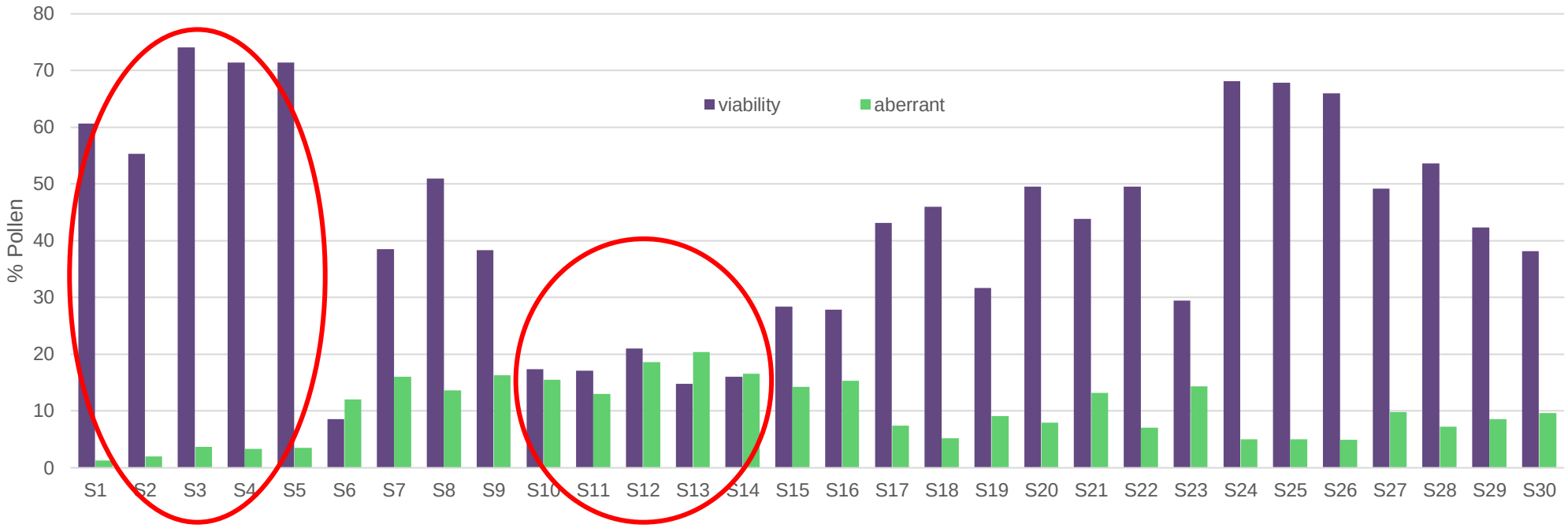
Reliability Increase: Interactions

- Climate change will cause more heat stress events
- Understanding of phenotype-genotype interactions
- Flowering period is the most susceptible to heat stress
- Pollen analysis provides plant stress information in a simple way, e.g., identification of QTL's



DEVELOPING CROP GENOTYPES RESILIENT TO THE WARMING CLIMATE

Cost Reduction: Systematic Line Screening



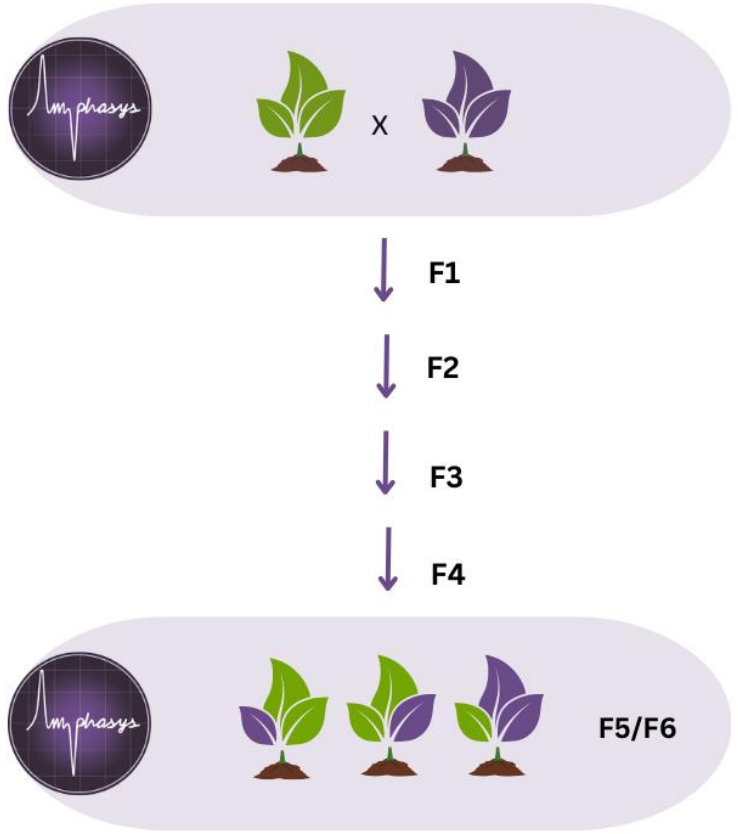
Crop: broccoli

- Identification of the best-performing lines based on pollen quality
- Systematic screening for more efficient breeding (e.g., of heat-tolerant lines)

EARLY SCREENING OF LINES PROVIDES INFORMATION WITH WHICH LINES TO CONTINUE

Cost Reduction: Selection of Pollinator Lines

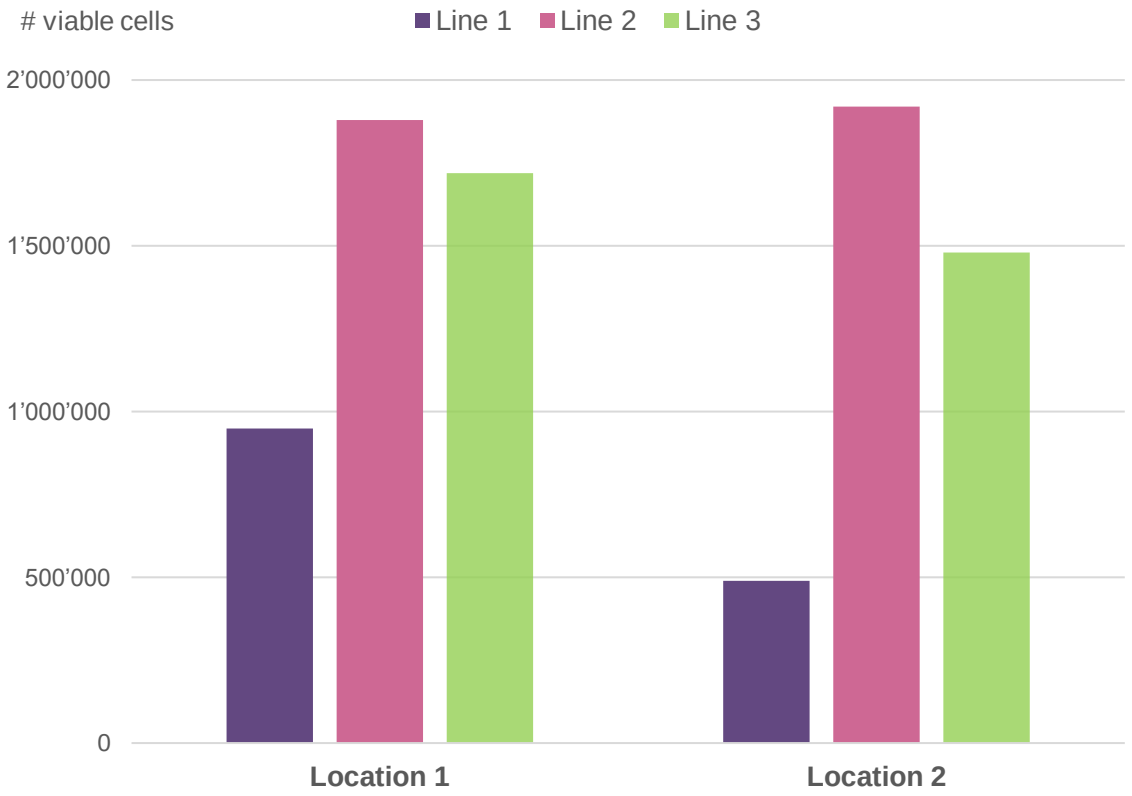
- Systematic screening of high pollen quality in parental lines and sibling lines in generation F5 or F6



EARLY IDENTIFICATION OF WEAK POLLINATOR LINES TO GET FASTER TO MARKET

Increase in Reliability: Crop placement

Crop: corn

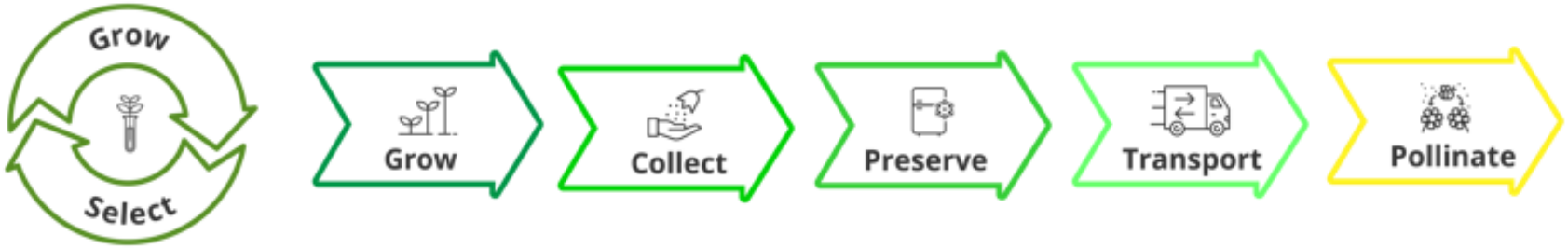


- Lines behave differently to climatic conditions
- Measurement of pollen quality for crop placement
- Information of indicators for heat or other stress

HIGHER RELIABILITY IN SEED PRODUCTION WITH SYSTEMATIC POLLEN QUALITY MEASUREMENTS

Reliability Increase: Routine Quality Control

- Routine quality control is indispensable for pollen farms and nurseries
- Full quality control along the whole value and supply chain

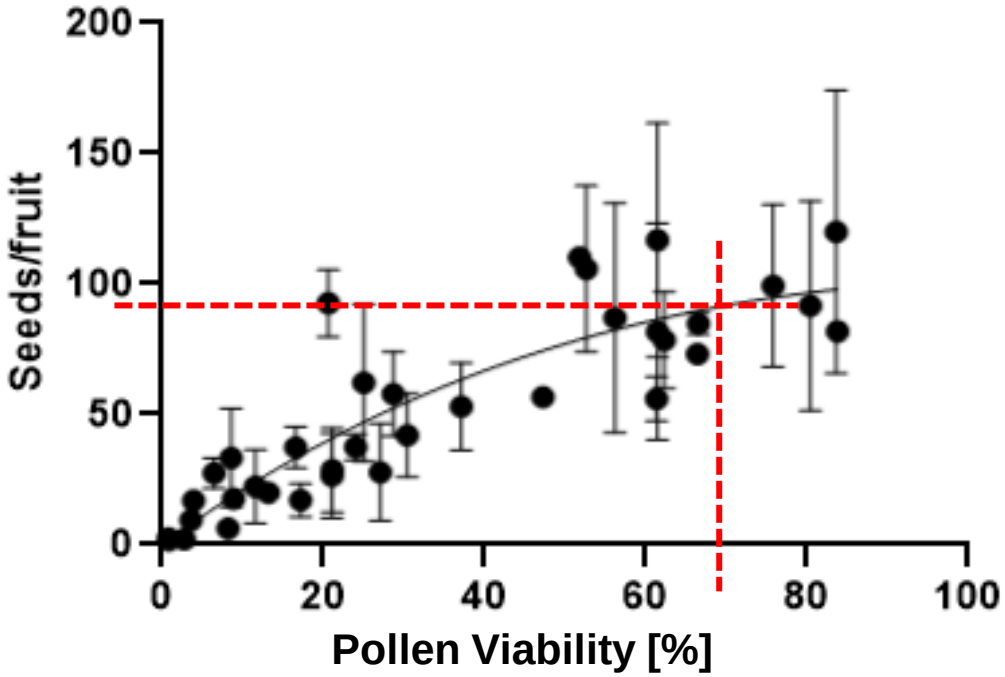


HIGHER RELIABILITY AND HIGHER SEED SET WITH CONTROLLED POLLEN QUALITY

FAST, EASY AND ACCURATE DETERMINATION OF POLLEN QUALITY EVEN REMOTELY

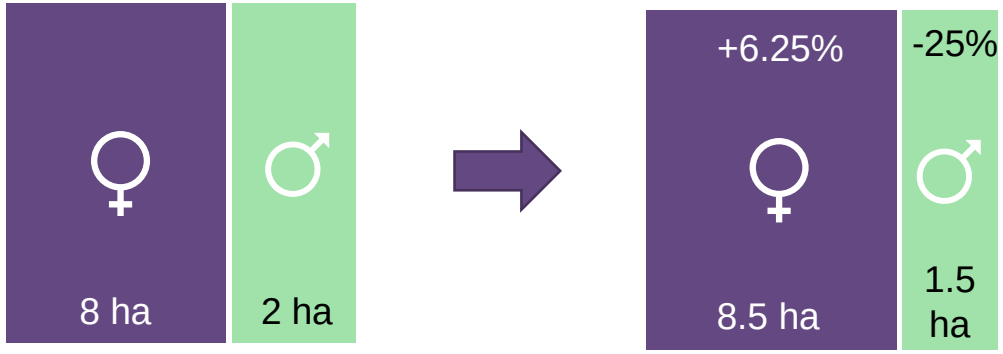
Increase Efficiency: Viability-Seed Set Correlation

- Pollen viability shows a wide variation
- Seed set is a function of pollen viability and quantity
- Determination of the viability threshold increases predictability of expected seed set



ESTABLISHING A POLLEN VIABILITY – SEED SET CORRELATION GUARANTEES MORE STABLE SEED PRODUCTION

Increase Efficiency: Female-to-male ratio



female : male
4:1

female : male
~6:1

- Pollen information to reduce surface for male lines
- Pollen analysis to develop pollen storage protocol

Increased seed production:	**+50 kg of seed**
Seed price:	**1000 $/kg**
Benefit:	**50’000 $**

How does our solution look like?

Ampha Z40
Laboratory Pollen Analyzer

Ampha P20
Portable Pollen Analyzer

Ampha Z40

- Versatile lab benchtop device
- Universal applications: e.g.,
  - Measure all kind of pollen
  - Flexible settings
- Determination of Microspore developmental stages for DH production
- Pollen ploidy

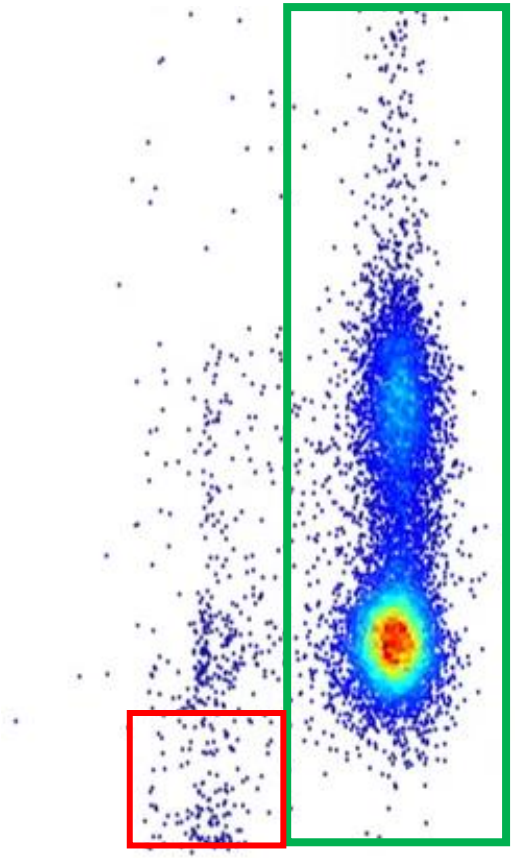
UNIVERSAL POLLEN ANALYZER

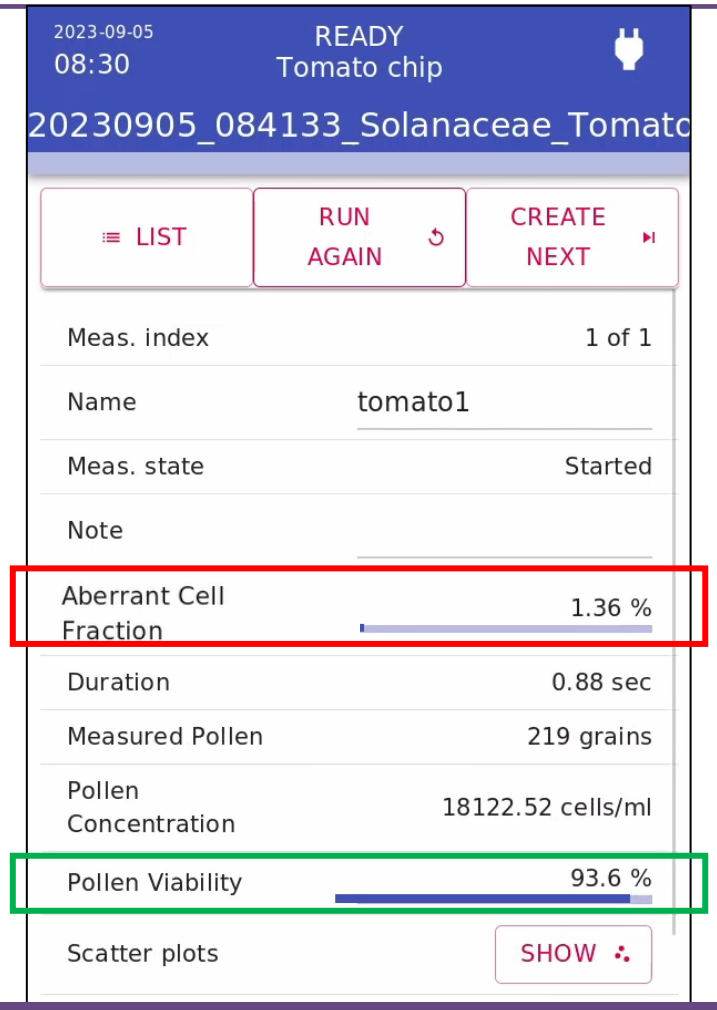
Ampha P20

- In-field measurements (short lived pollen)
- Portability
- Operation without a PC/Laptop
- Easy handling
- Automated data analysis
- Less user training required

THE FIRST FULLY PORTABLE POLLEN ANALYZER

Automated Data Analysis





REAL TIME DATA ANALYSIS

Automated Data Analysis – Crop Specific Chips

- Standardized pollen monitoring routine
- No user bias
- Real-time data analysis
- Immediate results = immediate decision making

Take-away Message

- Exact knowledge about your lines and your pollen quality
- Better control of processes and planning
- Savings of costs and resources
- Achieving higher efficiency and yield

Thank you
for your attention!

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