



# QUALITY SEED STARTS WITH QUALITY POLLEN

Increase breeding efficiency and achieve high yields in seed production through pollen quality monitoring

# Breeding

Pollen quality is an essential factor for plant breeders. Temperature, humidity and other factors like the application of chemical agents or inbreeding depression have a direct impact on pollen quality. Therefore, routine pollen viability monitoring allows to select the best moment for cross-pollination and to produce new elite lines faster.

Traditional pollen analysis methods are based on staining or germination. They involve time-consuming manual lab work with low accuracy and small number of samples. Now, on the Ampha™ Z32, you can get a precise measure of the pollen viability at any time and analyze hundreds of samples a day. This mobile screening tool is ideal for analyzing pollen in the lab or directly in the field.



## Improve Breeding Efficiency

Pollen viability monitoring allows you to maximize the time window you have for crosses in the field. Start pollinating when the pollen is ready, and stop when quality becomes too low. Select the best moment for pollen collection to get sufficient viable pollen from inbred depressed lines with reduced pollen production or even adjust the pollen vigor in your master lines to enhance crossing success.

## Breeding for Heat Tolerance

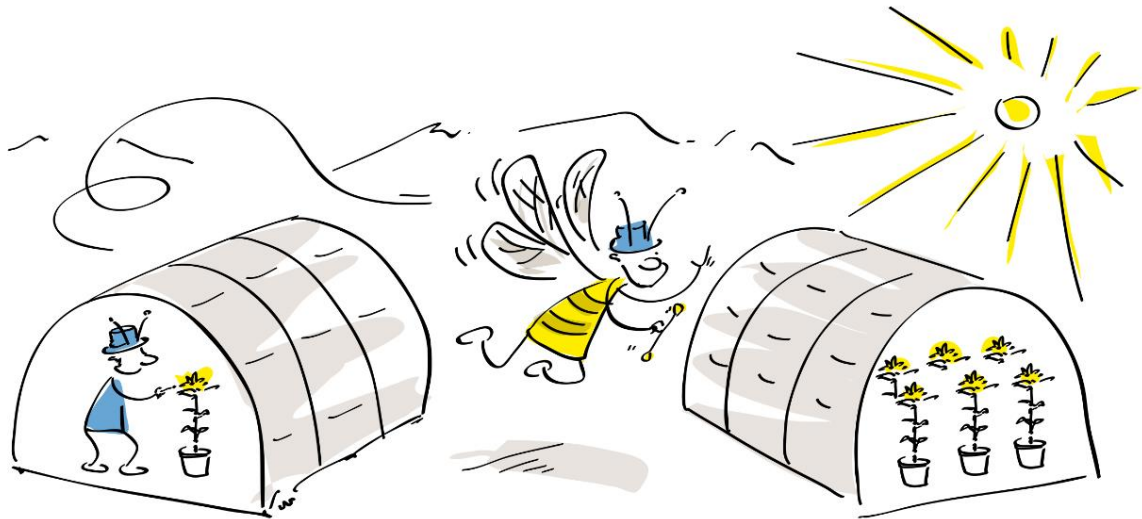
Pollen development is highly heat sensitive and essential for seed formation. Decreasing pollen viability at elevated temperatures due to global warming has already lead to reduced grain production in many crops. Therefore, include pollen viability as an essential parameter when breeding for heat tolerance.

## CMS Monitoring

Pollen viability monitoring is the fastest method to determine the sterility of cytoplasmic male sterile (CMS) lines. Gain confidence in your CMS line selection, confirmation of CMS status and check fertility restoration in F1 with accurate data from over 10'000 pollen analyzed per measurement!

# Hybrid Seed and Crop Production

Seed and fruit yield are dependent on successful pollination. Excessive warm nights, draughts, rain and insecticide applications negatively affect the quality and timing of pollen shed. Poor pollen viability and quantity leads to a reduced seed set and yield loss. Consequently, measuring and understanding pollen quality in hybrid seed production allows maximizing yields, improve the female to male ratio and forecasting your yield.



## Manual Pollination

Manual pollination, required for some high quality hybrid seed productions, takes a lot of effort and is expensive. To minimize the cost of production and to ensure that this effort results in highest yields, pollen viability should be confirmed before harvesting the pollen and pollination. For example, in tomatoes the seed yield can be optimized by mixing pollen of different qualities to arrive at the required viability level, allowing a maximum seed set.

## Pollen Collection and Storage

For seed production, especially in settings where male and female lines are kept in separate locations, the timing of the pollen harvest in the maturing flowers has to be chosen carefully to assure optimal viability. In addition, ideal conditions for storage and transport need to be established to minimize loss of viable pollen.

## Increase Female to Male Ratio

Counting pollen as part of a pollen dispersion analysis is the standard method for calculating the minimum number of males needed for optimal pollination in hybrid seed production. With the Ampha Z32 instrument you can also count pollen in Isoton® to improve the female to male ratio and yield by area.





# The Ampha Z32

Amphasys uses impedance flow cytometry (IFC) to rapidly characterize cells in suspension based on their electric properties. Impedance is measured in a microfluidic chip and results are displayed on a scatterplot. Software supported analysis allows to get precise statistics about the cell populations.

Amphasys offers optimized buffers and one protocol for pollen of more than 200 species. The microfluidic chip is available in several channel dimensions, covering the wide range of pollen sizes found in nature.

## References

**Prof. Ivo Rieu, Radboud University:** *“The Ampha Z32 system has enabled us to analyze thousands of tomato plants grown at high temperatures and led to the discovery of several old tomato varieties that can maintain their pollen health and final yield much better than the current ones.”*

**Todd Krone, CEO of PowerPollen<sup>SM</sup>:** *“We use the instrument to check pollen quality before pollination, to improve pollen preservation and for rescue pollinations when natural pollination was not sufficient to get a good seed yield.”*

**Joep Lambalk, R&D Director at Enza Zaden:** *“By use of the Ampha Z32 in disease assays and plant crosses, we could improve the efficiency of these processes by 30%, allowing to significantly reduce cost.”*

### QUALITY CONTROL

through viability check and pollen count in < 1 minute

### OTHER APPLICATIONS

pollen ploidy check and microspore development stage determination

### SIMPLE WORKFLOW

no need for incubation

### ROBUST

no optics, no calibration and no toxic labels needed

### AUTOSAMPLER

option for automation of up to 192 samples

### MOBILE

suitable for analysis in the field or greenhouse

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