



CREATING
A CIRCULAR
FUTURE

HIGH TEMPERATURES AFFECT POLLEN FERTILITY MORE THAN ALTERED GRAVITY: BOTTLENECKS IN THE REPRODUCTIVE CYCLE OF MICRO-TOM

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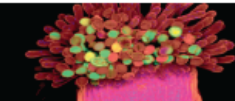




LIFE CYCLE AND SPACE CROPS



plant biology



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REVIEW ARTICLE

Microgravity effects on different stages of higher plant life cycle and completion of the *seed-to-seed* cycle

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MICRO-TOM



Standard



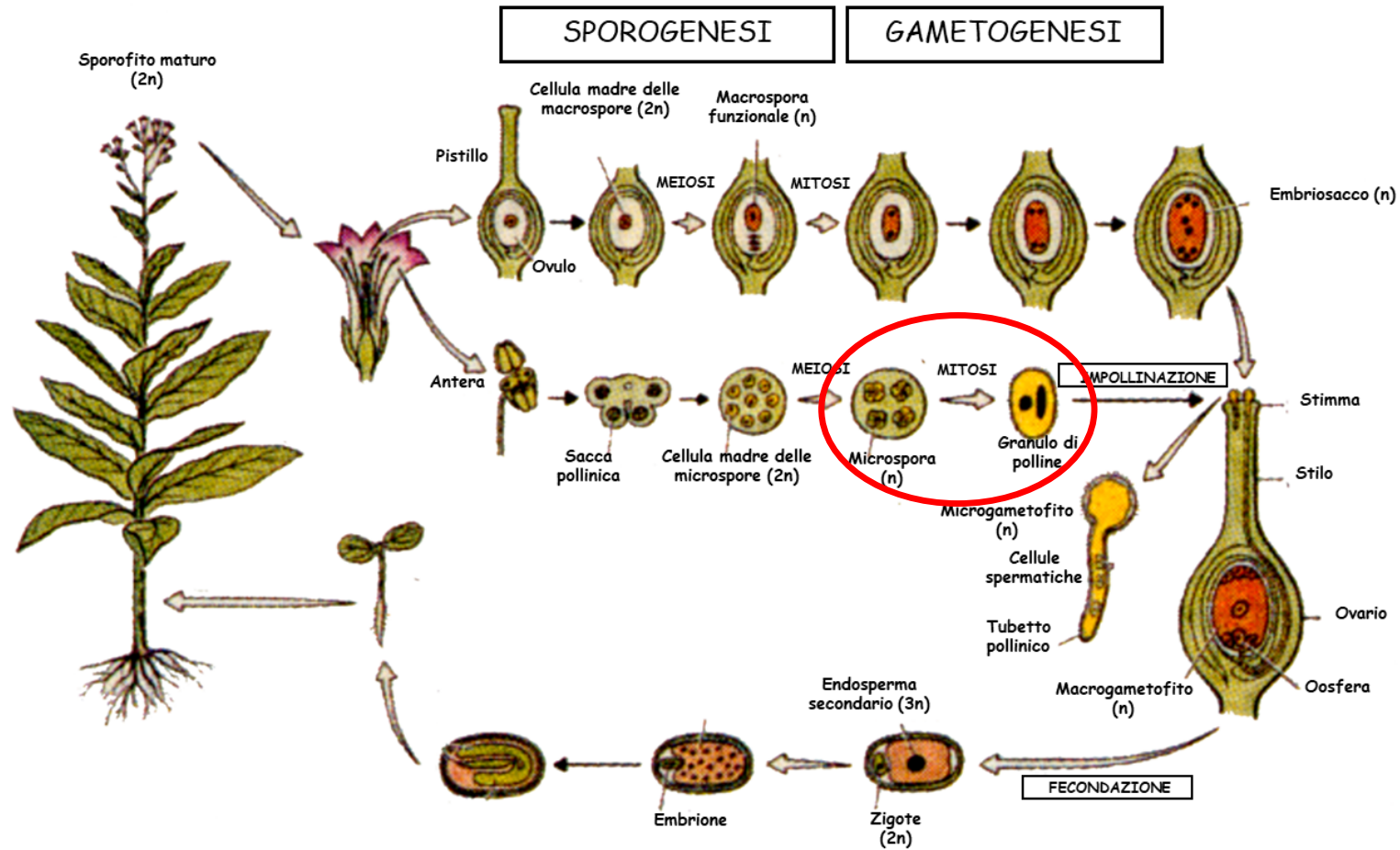
Dwarf



Controlled
Environment



REPRODUCTIVE CYCLE OF ANGIOSPERMS

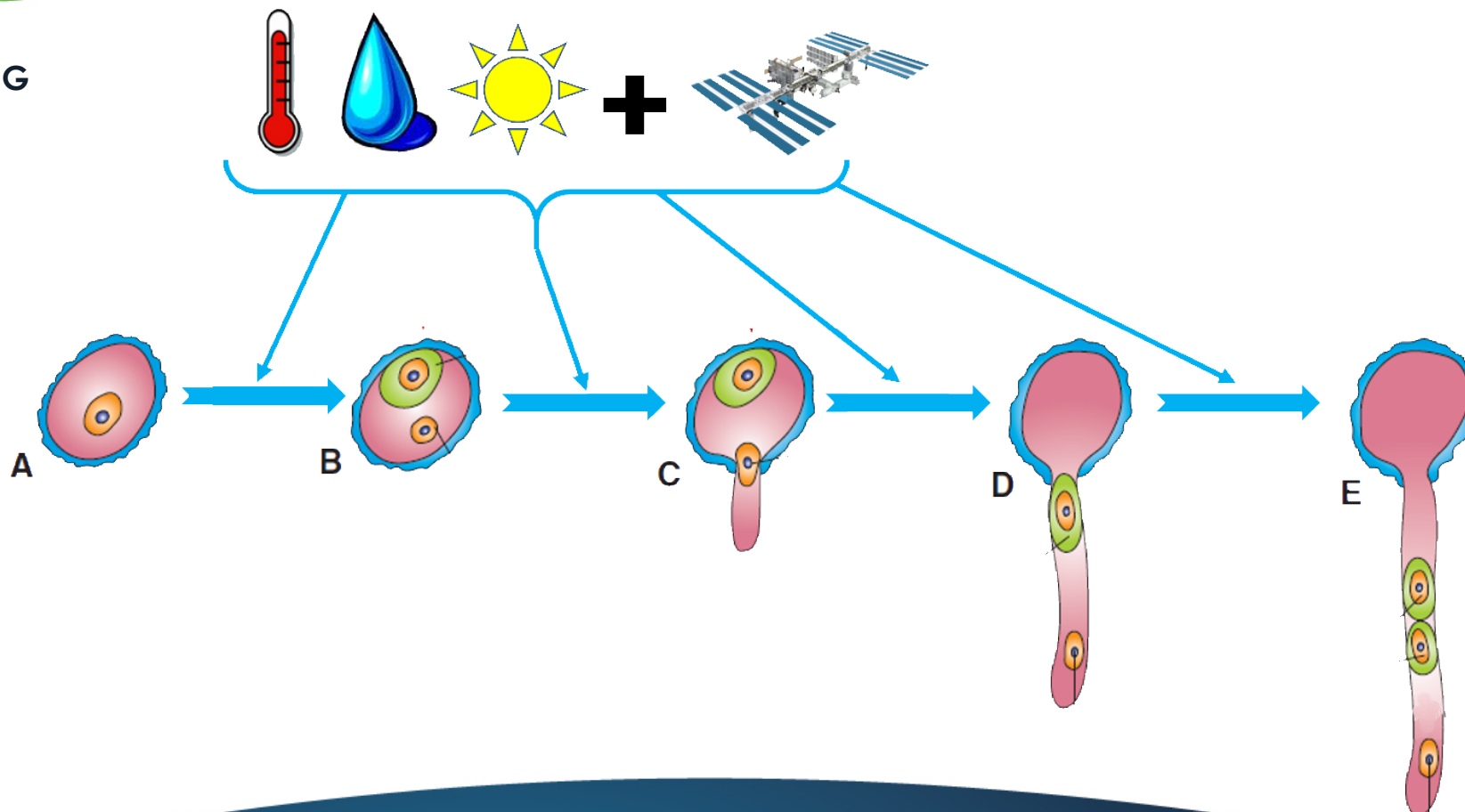


POLLEN DEVELOPMENT

PRE-FLOWERING



FLOWERING

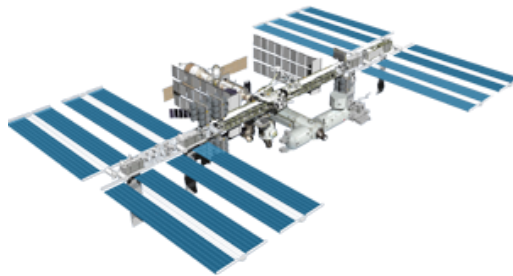




RESEARCH QUESTION

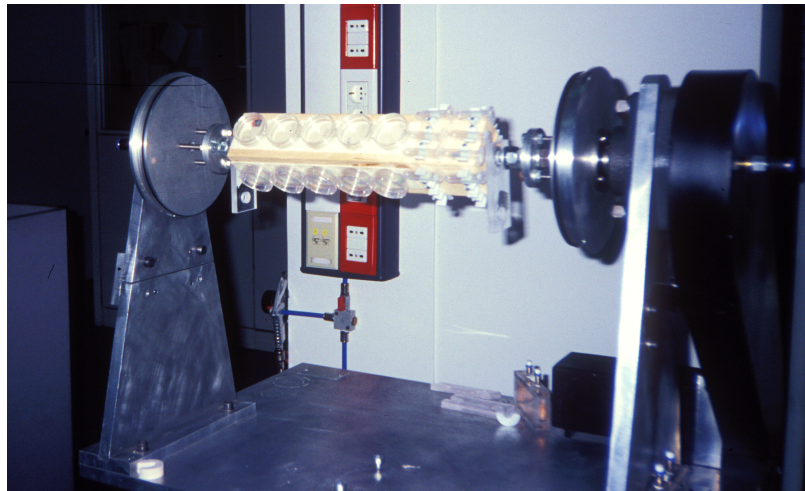


Does altered gravity affect pollen
functionality of Micro-tom?

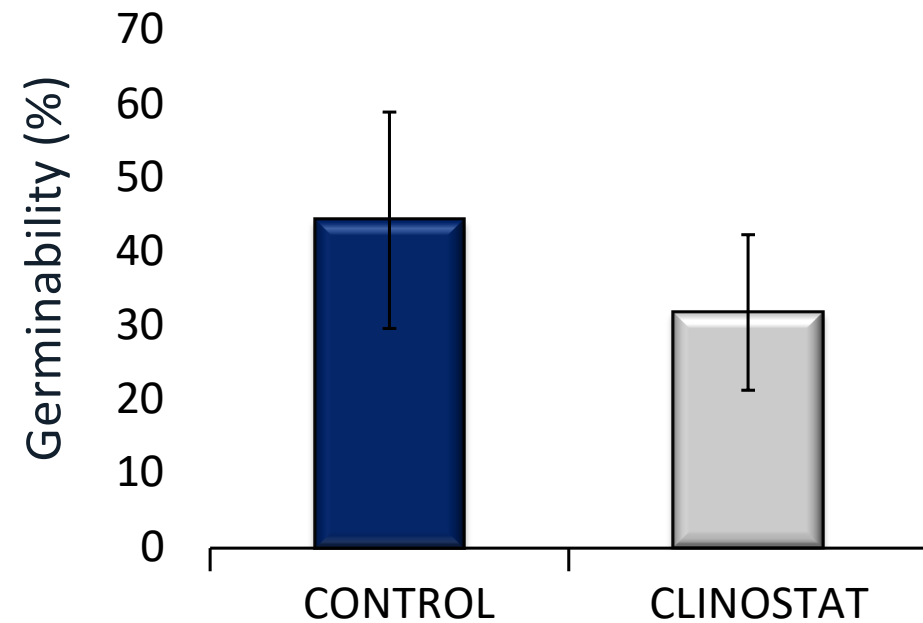




SIMULATED MICROGRAVITY



Germinability test on Clinostat





RESEARCH QUESTION



Do high temperatures during pollen development affect the reproductive cycle of Micro-Tom?



MELISSA



MICRO-TOM



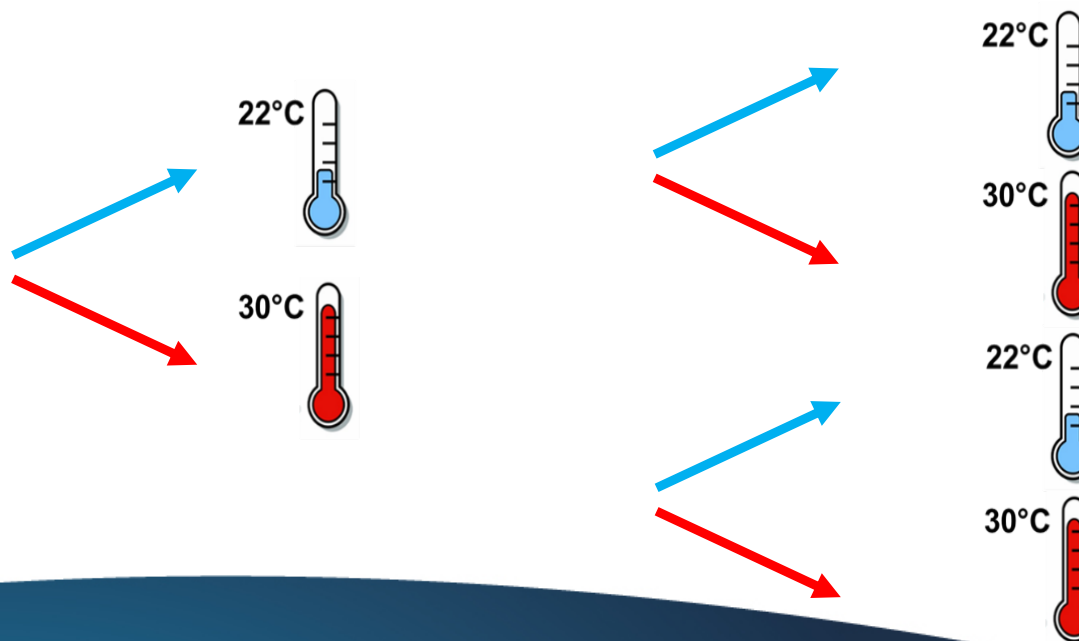
METHODOLOGICAL APPROACH



*Pre-flowering
(Pre-pollen formation)*



*Flowering
(Post-pollen formation)*



DIPARTIMENTO DI
AGRARIA

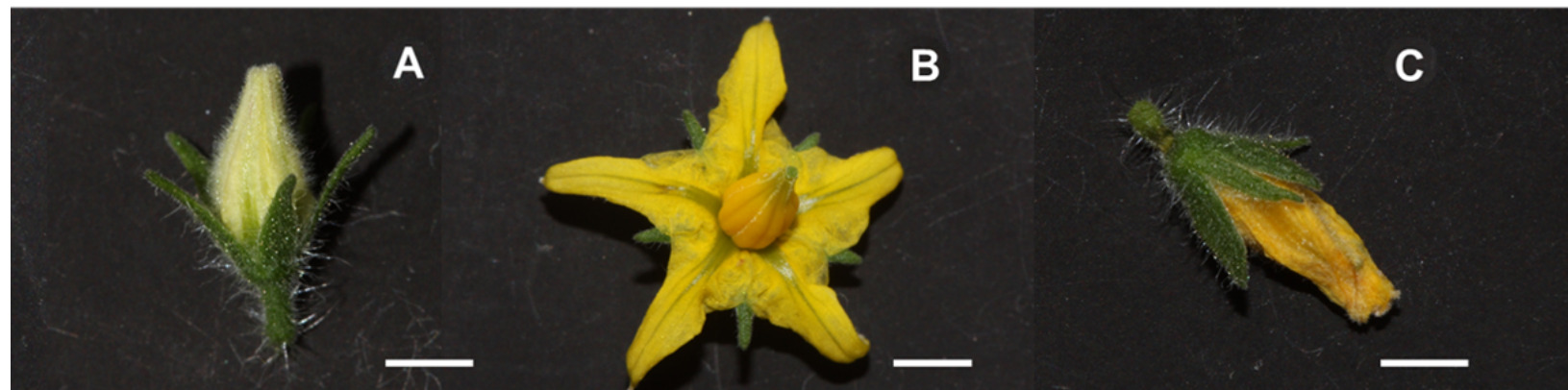
POLLEN FUNCTIONALITY THROUGHOUT FLOWERING



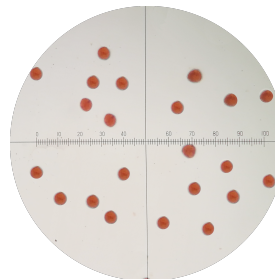
A) Closed corolla

B) Anthesis

C) Post-anthesis



48h incubation



Viability



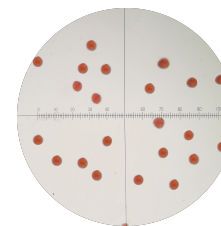
Germinability



More than 10000
pollen granules
scored

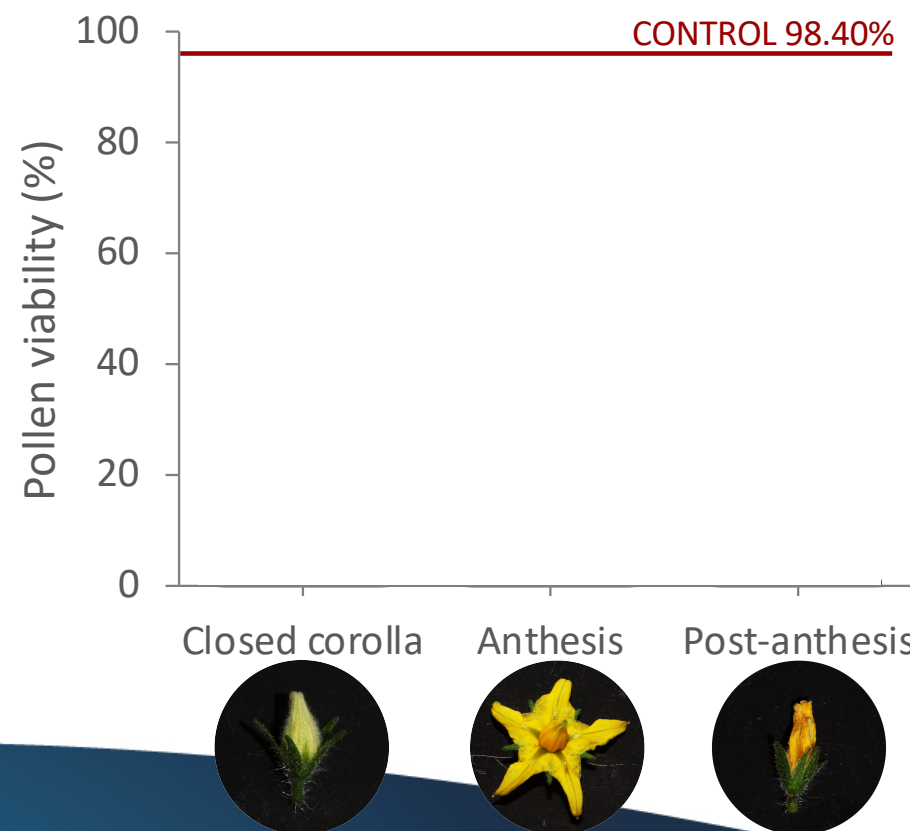
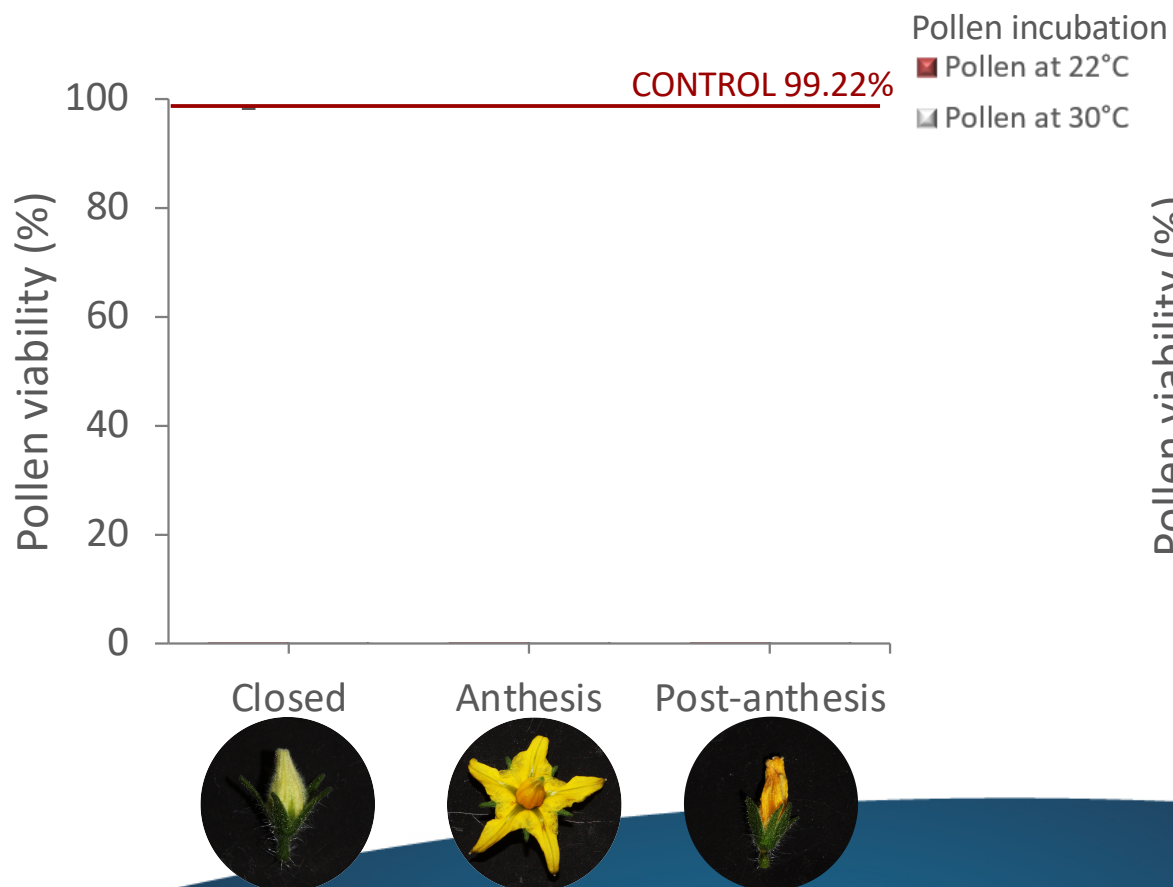


RESULTS: VIABILITY



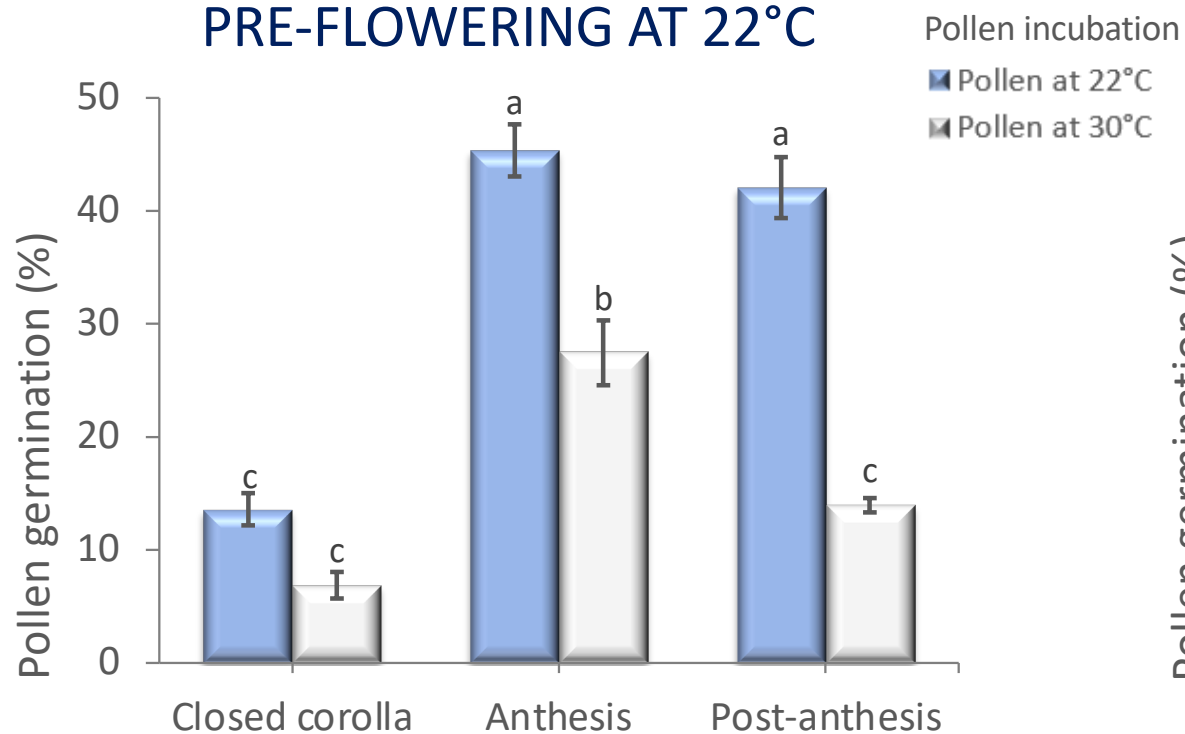
PRE-FLOWERING AT 22°C

PRE-FLOWERING AT 30°C

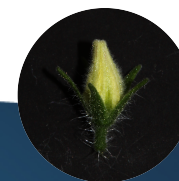
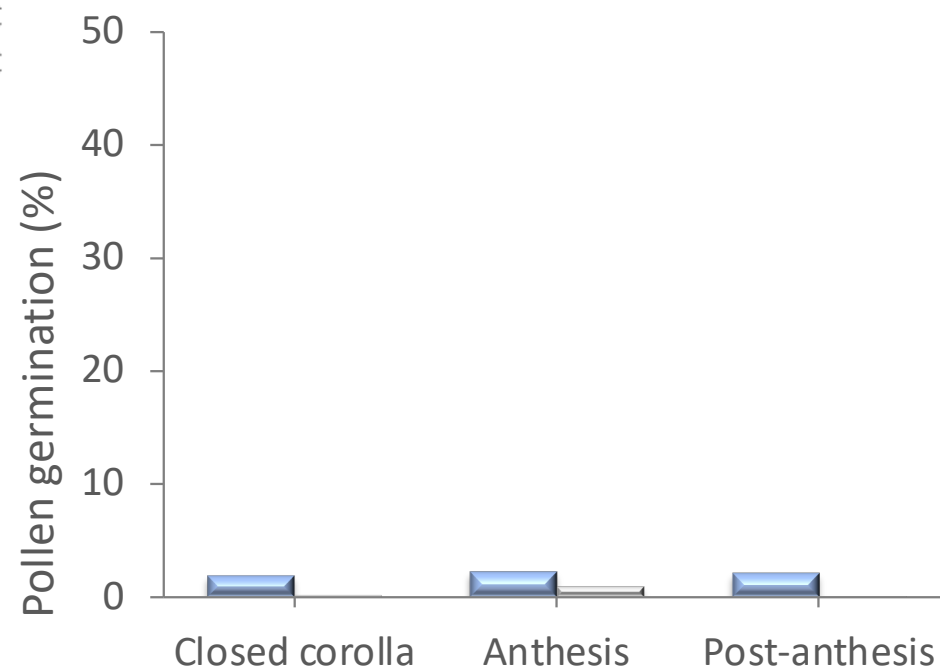




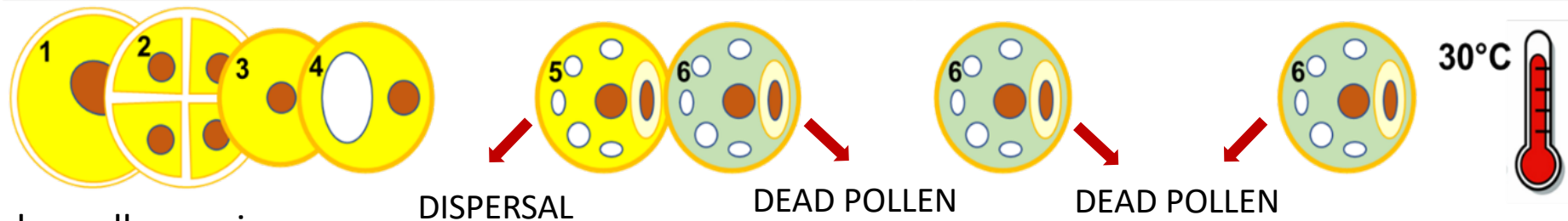
PRE-FLOWERING AT 22°C



PRE-FLOWERING AT 30°C



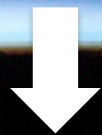
EFFECT OF TEMPERATURE ON POLLEN ONTOGENESIS



5) Bicellular pollen grain

CONCLUDING REMARKS

- Simulated microgravity under optimal temperature does not affect pollen germinability
- Few C° degrees over optimum during the earliest stages of pollen development significantly affected pollen functionality, pollen thermo-tolerance and pollen longevity
- The earliest stages of pollen development represent a bottleneck in the seed-to-seed cycle and must be considered for scientific experiments and hardware development aimed to grow Micro-Tom plants in space



New experiment on the ISS to assess
pollen functionality in real microgravity



THANK YOU.

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