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Seed Germination in Two New *Miscanthus* Hybrids

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Introduction

The Di3A of the University of Catania (Italy) is involved in a research program for the improvement of the propagation technology in *Miscanthus* spp. The propagation by seeds in this rhizomatous grass offers several advantages, but is strongly limited by a low germination of the seed. In the framework of the MIUR-PRIN project *Technical and biotechnology innovations in perennial lignocellulosic crops for the production of bioenergy, green building and furniture panels*, a preliminary study is in progress, to assess the seed germination traits in two new hybrids of *Miscanthus* spp.

Materials and Methods

Plant material

- ✓ Seeds of 'GNT43A' (*M. sacchariflorus* x *M. sinensis*) and GNT3B' (*M. sinensis* x *M. sacchariflorus*) (year of production: 2020; site: experimental farm, University of Catania)

Seed preparation for germination assay and measurements

- ✓ Head drying after harvest (November 2020) at 30°C for five days
- ✓ Head samples separated into three parts (apical, central and basal), 20 spikelets per each part sampled for fertility and seed weight measured
- ✓ Seeds tested for germination at harvest and stored at room temperature (15-20°C) or 8°C to assess germination (at 25°C) during storage (6 months)
- ✓ Final germination percentage (GP, %) calculation
- ✓ Tetrazolium test for seed viability assessment, on seeds not germinated at harvest.

Results

Head fertility not exceeded 53.3% in 'GNT43A' and 43.3% in 'GNT3B' (Tab. 1). In both hybrids, it was the lowest in spikelets positioned in the basal part of head. Seed weight, on average the 26% higher in 'GNT3B', did not change with seed position ('GNT43A') or slightly decreased from the apical to the basal part ('GNT3B'.)

Tab. 1. Spikelet fertility (% ± es) and 100-seed weight (mg ± es) in Miscanthus 'GNT43A' and 'GNT3B', in relation to spikelet position.

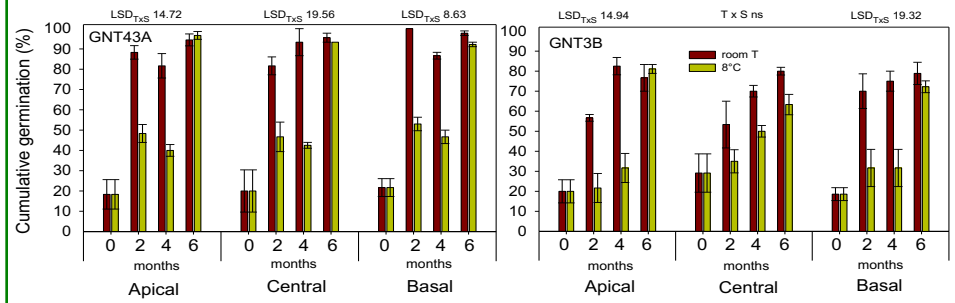
Spikelet position	%		mg	
	GNT43A	GNT3B	GNT43A	GNT3B
Apical	53.3±0.83	38.3±1.67	44.5±0.86	63.2±2.11
Central	49.2±0.83	43.3±2.20	44.0±0.89	58.9±1.35
Basal	25.8±1.67	32.5±2.89	43.3±0.65	56.5±1.43

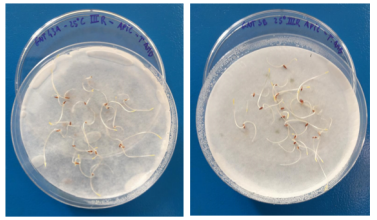
Tab. 2. Seed viability (%) at tetrazolium test in relation to spikelet position.

Spikelet position	%	
	GNT43A	GNT3B
Apical	80.0	80.0
Central	80.0	100.0
Basal	60.0	60.0

Germination was poor just after harvest (< 30% in both hybrids). Tetrazolium test on ungerminated seeds revealed that most of them were viable (Tab. 2), suggesting that a dormancy took place at seed ripening, that did not allow the seeds to germinate just after harvest.

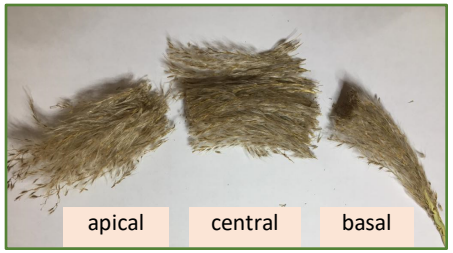
GP significantly improved during storage, more markedly in 'GNT43A'. Seeds stored at room temperature seemed to release dormancy faster than those kept at low temperature (8°C), and after 2-month storage, GP exceeded 80% in 'GNT43A', and 50% in 'GNT3B', in seeds stored at room temperature, whilst GP was still low in those stored at 8°C. After total 6-month storage, GP overall exceeded 92%, in 'GNT43A', and picked at 80% only in seeds stored at room temperature, in 'GNT3B'. In relation to spikelet position, no great differences were observed in 'GNT43A'. In 'GNT3B', seed dormancy seemed to be released faster in seeds of the central part. Overall, seeds of 'GNT43A' germinated better than those oh 'GNT3B'.





GNT 43A (*M. sacchariflorus* x *M. sinensis*)

GNT 3B (*M. sinensis* x *M. sacchariflorus*)



Conclusions

A seed dormancy occurs in *Miscanthus*, that makes seeds unable to germinate promptly at harvest. Storage at room temperature helps the seeds to release dormancy rapidly. Seeds from the apical and central part of spikelets, having greater fertility and more viable seeds, are to prefer, when propagation by seeds in field is adopted.