



TEMPERATURE EFFECT ON SEED GERMINATION RATES OF DIFFERENT WINTER LEGUMES AND SPRING CEREALS

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Cereals are of enormous economic importance, while *Sorghum* and switchgrass occupy the 5th and 6th position, respectively, in the global production (FAOSTAT Database). *Sorghum* in Europe is mainly grown for its grain and as animal feed in Italy and France (FAOSTAT 2006). In some regions of Africa, it has been found that switchgrass can cover 90% of energy in nutrition.

On the other hand, legumes are in the second place, in terms of their importance. They are crops of low input requirements and are suitable to sustainable agriculture schemes. Legumes are grown for human and animal nutrition, and as green fertilization.

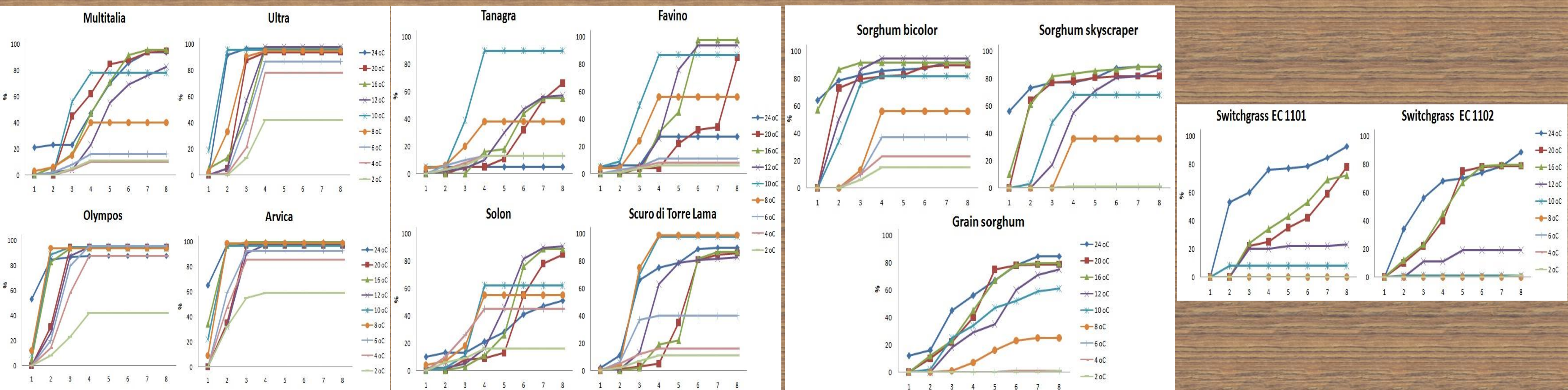
Successful crop establishment depends on seed quality, environmental factors and genotypes. Literature confirmed that there are differences in the response of the seeds and seedlings to different temperatures in association with their geographic origin.

The purpose of this study was to quantify the germination temperatures of 8 varieties of winter legumes and 5 varieties of spring cereals.

Material & Methods

The study was performed in a growth chamber adjusted to 9 different temperatures (24, 20, 16, 12, 10, 8, 6, 4, 2 °C) for 8 varieties of winter legumes (*Lupinus albus* L.–vs Multitalia and Ultra, *Pisum arvense*–vs. Arvica and Olympus, *Vicia faba*–vs Tanagra, Favino, Solon and Scuro di Torre Lama), 3 varieties of spring cereals (*Sorghum bicolor*–vs EJ 7282, *Skyscraper*, *Grain sorghum*–*Pacific Graze*), and 2 varieties of a perennial cereal (*Switchgrass*–*Panicum virgatum*–vs. EC 1101 and EC 1102). Each treatment was repeated 4 times for each temperature value. 100 seeds were placed in different separate petri dishes with sheets of filter paper. The trial was commenced as soon as the seed was exposed to the moist filter paper. The measurements were taken every day for the high temperatures and every second day for the low temperatures.

Results



Seed germination percentage for 8 varieties of winter legumes (*Lupinus albus* L.–vs Multitalia and Ultra, *Pisum arvense*–vs. Arvica and Olympus, *Vicia faba*–vs Tanagra, Favino, Solon and Scuro di Torre Lama) for the different tested temperature.

Seed germination percentage for 3 varieties of spring cereals (*Sorghum bicolor*–vs EJ 7282, *Skyscraper*, *Grain sorghum*–*Pacific Graze*), and 2 varieties of Switchgrass (*Panicum virgatum*–vs. EC 1101 and EC 1102).

- Ultra had higher growth rates than Multitalia.
- Arvica and Olympus germination rates were similar.
- Scuro di Torre Lama was the only one that managed to reach almost the 100% at almost all temperatures.
- Sorghum bicolor EJ 7282 variety had the highest rate of vegetation than the other two varieties.
- Switchgrass (*Panicum virgatum* L.) for both varieties shown that temperature below 10 °C is a limiting germination factor.

Almost in all varieties of the different species that were studied, it was observed that at high temperatures the vegetation rate was higher. Firstly, from the spring cereals, the germination capacity of sorghum varieties was Sorghum bicolor EJ 7282 > Sorghum skyscraper > Grain Sorghum, while *Panicum virgatum* varieties were EC 1101 > EC 1102. In terms of winter legumes, the germination rate of lupine, pea and field beans varieties was as follows: Ultra > Multitalia, Arvica > Olympus and Scuro di Torre Lama > Solon > Favino > Tanagra.

As a general conclusion is that *Vicia faba* may satisfactorily germinate in rather cool micro-environments, and their sowing in the fall may be postponed for some weeks without substantial germination risk comparing to the rest legume species, while switchgrass is forbidden to be sowed if temperature is lower than 12 °C.

Acknowledgment: This research has been co-financed by the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE (project ocde:T1EDK-01491).