

Effects of Hydrophilic Coating on the Mobilisation of Endosperm Reserves in Seedlings of Spring Barley (*Hordeum vulgare* L. Maltasia)

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Introduction

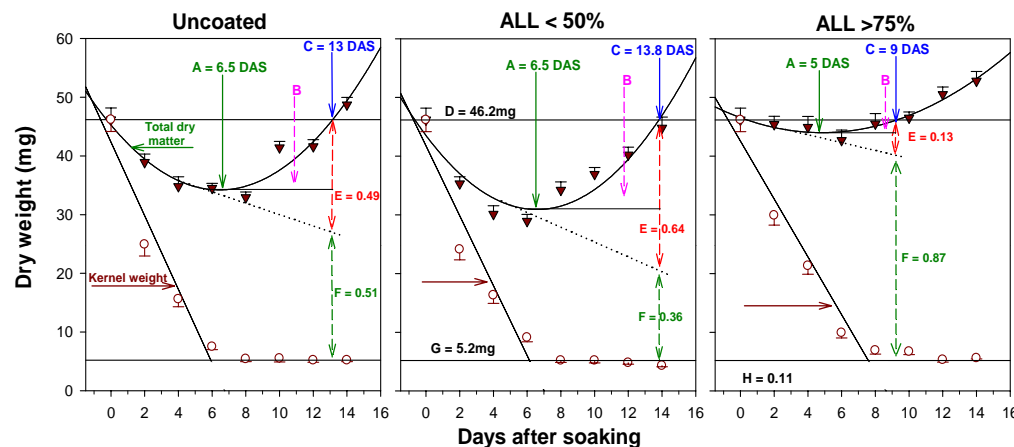
Hydro-absorber coated seeds increase the amount of water available for germination, supporting seedling establishment particularly when unreliable rainfall early in the season leads to drought spells. Efficient mobilisation of seed reserves is a key parameter for early crop establishment. Here we report on the effects of seed coats of different composition on endosperm mobilization. Treatments were barley seeds coated with (1) Absorber alone (2) Humic acid alone (3) ALL (Humic acid plus Absorber plus a plant fortifier) The coated seeds were further categorized in to two groups: thin coat <50% and thick coat, >75% based on their share in the total grain weight. Seeds were assessed for mobilization of seed reserves and onset of photo autotrophy compared to uncoated seeds.

Conclusion and Outlook

- Mobilisation efficiency depends on coat thickness and composition
- Thick coating is advantageous as more reserves are channeled towards growth
- The oxygen availability as well as metabolic pathways operating under reduced conditions will be investigated



Results and Discussion



Treatment	FLR	FMG	OA (days)	IGW (days)
Uncoated	0.49	0.51	6.5	13
ALL	< 50%	0.64	6.5	14
	> 75%	0.13	5	9
Absorber	< 50%	0.56	6	14.5
	> 75%	0.22	4	10
Humic acid	< 50%	0.63	6.2	14
	> 75%	0.13	4	8

Coating effects on reserve mobilisation in barley: A comparison of thick coat (ALL >75%), thin coat (Absorber <50%) with the uncoated seed: (A = Onset of autotrophy; B = Contribution of seedling photosynthesis to growth; C = Plant attains initial kernel weight; D = Initial kernel weight; E = Mobilized fraction lost to respiration; F = Fraction mobilized for growth; G = Husk weight); H = Structural fraction of husk; DAS = Day after soaking

Effects of different coating material on reserve mobilisation in barley.

FLR = Fraction lost to respiration; FMG = Fraction mobilized for growth; OA = Onset of autotrophy; IGW = time it takes to get back to initial grain weight

Uncoated seed

- Mobilised resources shared between respiration and growth in a 1:1 ratio
- Seedling contribution to photosynthesis is smaller compared with thin coat seeds but greater than in thick coated seeds

Thin coated seeds

- Showed higher respiratory and lower growth fractions
- Took similar number of days for autotrophy to begin as in uncoated seeds but initial dry matter loss was compensated later

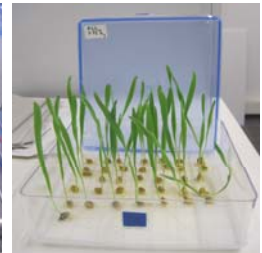
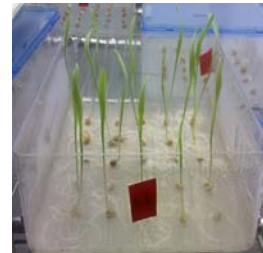
Thick coated seeds

- Showed reduced respiratory losses and large fraction in growth rate
- Onset of autotrophy was earlier and initial dry matter loss compensated attained earlier
- Exhausted their reserves more slowly

- Seeds coated with ALL and humic acid mobilized their reserves in a similar manner
- Respiratory losses were higher in absorber < 50% seeds compared with the other treatments having the same coat share
- The fraction dedicated for growth in Absorber >75% were lower compare to the other treatments with the same coat share

Notes on material and method

- Sorted grains were grown on moist filter paper (2 cm by 2.5cm) in growth chambers for 16 days at 25°C in labelled plates
- Biomass of root, shoots, and remaining grain were assessed for 24 seedlings every 2 days
- Dry weights were obtained after oven drying at 70°C



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