

the first hour, the seed weight has increased because of the imbibition process with 2.4 mg for wheat seeds, 3.6 mg for durum wheat seeds, 3.7 mg for triticale seeds, 8.0 mg for barley seeds and 14.9 mg for maize seeds (Fig. 3).

Compared to the average increasing rate (mg per hour) of the seed weight during the whole germination process, the average increasing seed weight after the first hour of the germination process was 2.7 times bigger for wheat seeds, 3.6 times bigger for durum wheat seeds, 2.5 times bigger for triticale seeds, 5 times bigger for barley seeds and 5.3 times bigger for maize seeds.

Compared to the other analysed cereal species, maize seeds absorb the largest quantity of water through the imbibition process in the first hour of the germination process, this been due to the fact that the maize has the largest seeds. Among other cereal species except maize, barley seeds absorb the largest quantity of water, while the wheat seeds absorb the smallest quantity of water through the imbibition process in the first hour of the germination process.

After the first hour of the germination process, the seed water content of the analysed cereal species was in average of 17.3%. The highest value was registered at barley with 22.1% (distinct significant difference compared to average for the analysed cereal species), while the smallest value was registered at maize with 14.1% (negative significant difference compared to average for the analysed cereal species). The wheat, durum wheat and triticale have registered comparable values, respectively 16.1% for wheat, 17.6% for durum wheat and 16.8% for triticale (Fig. 4). It has to be emphasised the rapid imbibition capacity of barley seeds. In the case of maize, although the average increasing seed weight after the first hour of the germination process was the biggest among the analysed cereal species, the quantity of water absorbed by seeds was not so important reported to the whole seed weight. This led to the smallest value of the seed water content at maize after the first hour of the germination process.

After two hours of germination, for all the analysed cereal species the seed water content increased in average with another 3% compared to the value registered after one hour. The average seed water content of the analysed cereal species was of 20.4% (Fig. 4). After two hours of germination process, as in the case after one hour, maize registered the smallest increase in the seed water content, respectively from 14.1 to 15.7%. Also, barley registered the highest value (24.6%), while wheat, durum wheat and triticale registered comparable values, respectively 20.0% for wheat, 21.0% for durum wheat, and 20.7% for triticale.

At the end of the germination process, the seed water content was in average for all the analysed cereal species of about 40% (39.9%). In this moment, triticale has registered the highest value, with 47% (very significant difference compared to average for the analysed cereal species), while barley has registered the smallest value, with 36.8% (negative distinct significant difference compared to average for the analysed cereal species). This time, the wheat, durum wheat and maize have comparable values, respectively 38.6% for wheat and durum wheat, and 38.3% for maize (Fig. 4). It has to be emphasised the triticale seeds capacity to absorb important quantities of water in the second period of the germination process.

Water uptake by seeds reported to their dry matter content at all analysed cereal species after the first hour of germination was in average about 21% (21.1%). The highest value was registered at barley seeds with 28.4% (distinct significant difference compared to average for the analysed cereal species), while the smallest value was registered at maize seeds with 16.4% (negative significant difference compared to average for the analysed cereal species). The values registered by the other analysed cereal seeds were the following: 19.1% for wheat, 21.4% for durum wheat, and 20.4% for triticale (Fig. 5). The proportions between species are similar to those registered at seed water content.

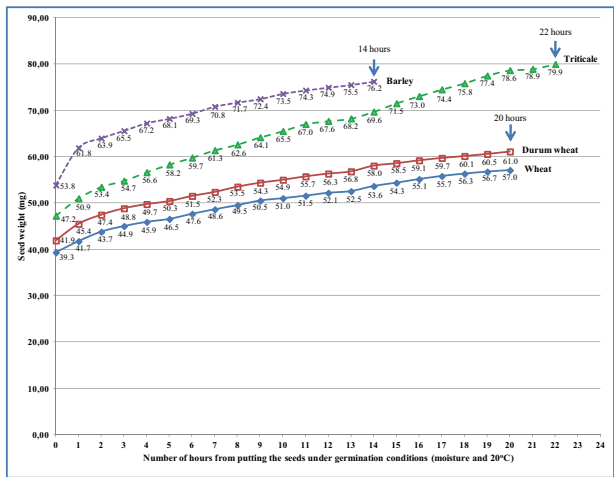


Fig. 1. Seed weight during the germination process at the analysed cereals

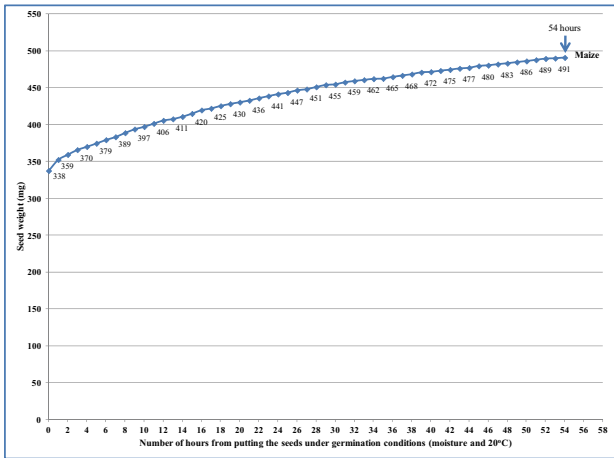


Fig. 2. Seed weight during the germination process at maize

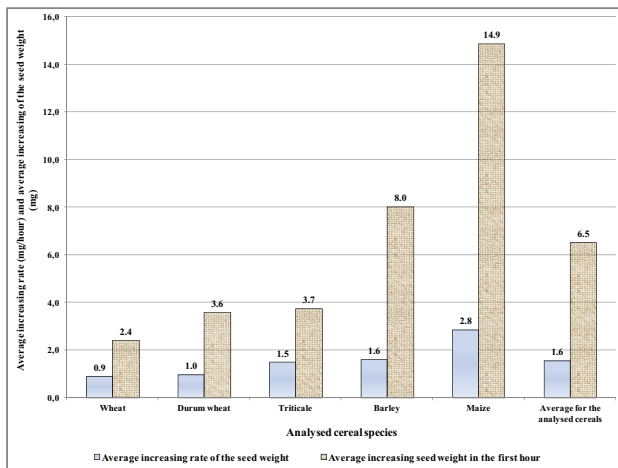


Fig. 3. Average increasing rate of the seed weight during the whole germination process and average increasing seed weight after the first hour of the germination process at the analysed cereals

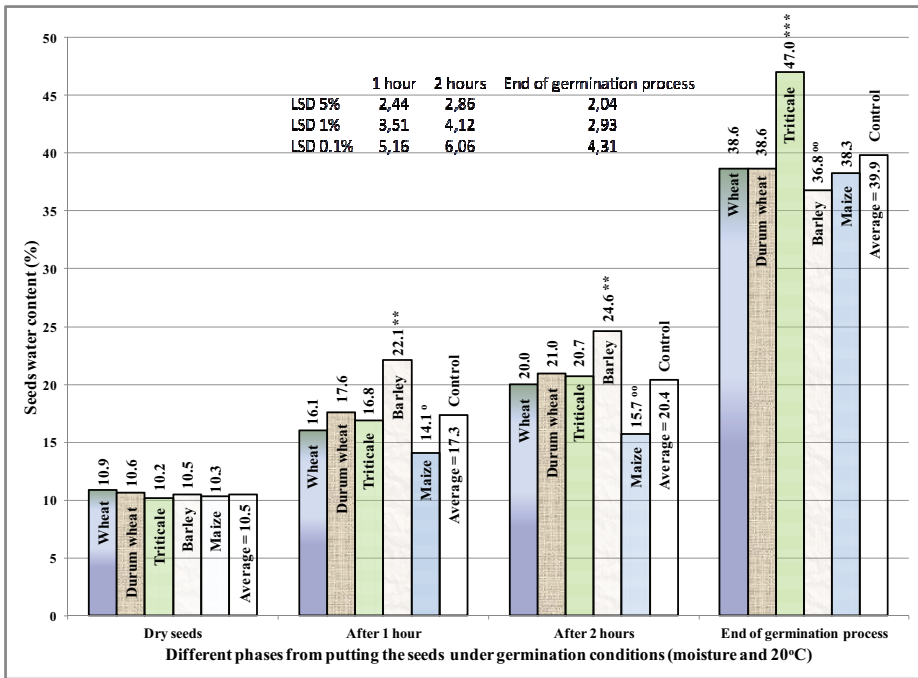


Fig. 4. Water content of seeds at the analysed cereals in different phases of the germination process

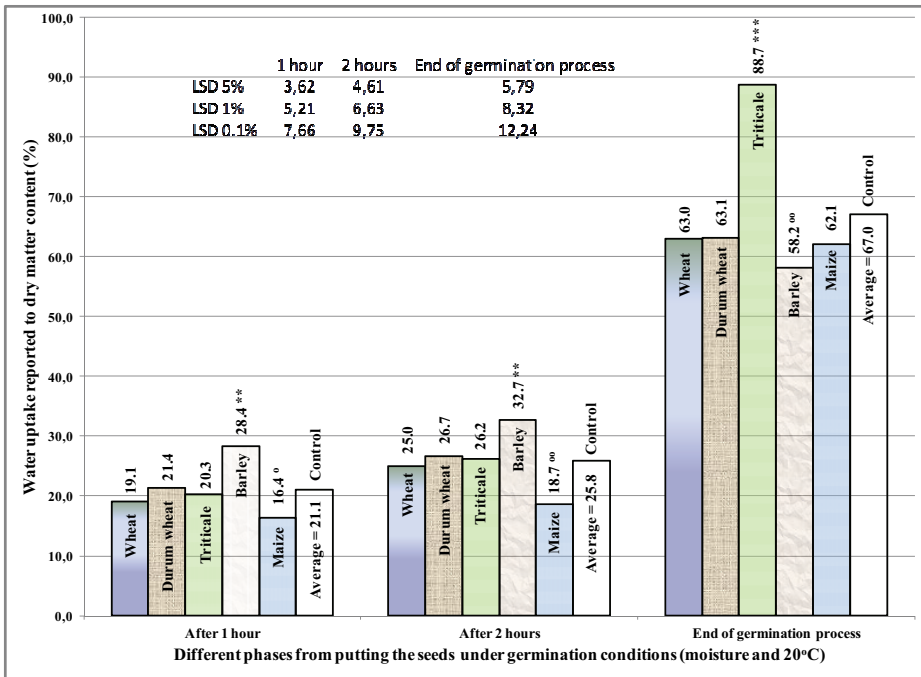


Fig. 5. Water uptake by seeds reported to their dry matter content at the analysed cereals in different phases of the germination process

After two hours of germination, the water uptake by seeds reported to their dry matter content at all the analysed cereals was in average about 26% (25.8%). As in the case of after the first hour of germination, the highest value was registered at barley with 32.7%, while the smallest value was registered at maize with 18.7%. The values registered by the other analysed cereal seeds were the following: 25% for wheat, 26.7% for durum wheat, and 26.2% for triticale (Fig. 5).

At the end of the germination process, the water uptake of seeds reported to their dry matter content at all the analysed cereals was in average 67%. The highest value was registered at triticale with 88.7% (very significant difference compared to average for the analysed cereal species), while the smallest value was registered at barley with 58.2% (negative distinct significant difference compared to average for the analysed cereal species). The wheat, durum wheat and maize seeds have registered comparable values, respectively 63% for wheat, 63.1% for durum wheat, and 62.1% for maize (Fig. 5).

CONCLUSIONS

At a constant temperature of 20°C, the germination process takes 14 hours for barley, 20 hours for wheat and durum wheat, 22 hours for triticale, and 54 hours for maize.

After the first hour of the germination process, the seed water content of the analysed cereal species was in average about 17%, while the water uptake by seeds reported to their dry matter content was in average about 21%.

At the end of the germination process, the seed water content at the analysed cereal species was in average about 40%, while the water uptake by seeds reported to their dry matter content was in average about 67%.

The seed water content registered the following values:

- for wheat, 16.1% after one hour and 38.6% at the end of germination;
- for durum wheat, 17.6% after one hour and 38.6% at the end of germination;
- for triticale, 16.8% after one hour and 47% at the end of germination;
- for barley, 22.1% after one hour and 36.8% at the end of germination;

- for maize, 14.1% after one hour and 38.3% at the end of germination.

The water uptake by seeds reported to their dry matter content registered the following values:

- for wheat, 19.1% after one hour and 63% at the end of germination;
- for durum wheat, 21.4% after one hour and 63.1% at the end of germination;
- for triticale, 20.3% after one hour and 88.7% at the end of germination;
- for barley, 28.4% after one hour and 58.2% at the end of germination;
- for maize, 16.4% after one hour and 62.1% at the end of germination.

Wheat, durum wheat and triticale have a comparable behaviour concerning the water uptake in the first hour of germination.

Wheat, durum wheat and maize have a comparable behaviour concerning the water uptake at the end of the germination process.

Barley seeds absorb very rapidly water in the first hour of germination, but at the end of germination process, they have the smallest water content and the smallest water uptake by seeds reported to their dry matter content among all analysed cereals.

Triticale has the highest values for water seed content and water uptake by seeds reported to their dry matter content at the end of germination process.

Maize has the smallest values for water seed content and water uptake by seeds reported to their dry matter content after the first hour of germination.

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