Results Regarding Seed Germination of Agastache Foeniculum (Pursh) Kuntze

Cristina Firuţa MATEI, Marcel M. DUDA, Marius V. OLAR,
Anca Eva ARDELEAN, Mariana Niculina MĂDAŞ

Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur nr. 3-5, Cluj-Napoca, Romania; cristinamatei_26@yahoo.com

Abstract. Species from Agastache genus are part of mint family (Lamiaceae) and their flowers represent a lure for insects (bees, butterflies etc.). The common name of hyssop comes from the plant’s hyssop flavour. Commercially, this plant is considered as having culinary importance. Several varieties of this species were selected in Canada, for their essential oil, which contains methyl chavicol. The species was cultivated in Moldavia, as an experiment, for essential oil production. The herb (Agastache foeniculi herba) is used for therapeutic purposes in treating cardiovascular, nerve and gastrointestinal affections, in treating cold, fever (North America Indies used the infusion for this intent) and as a diaphoretic. It also has antiemetic, antibacterial and antifungal properties. It improves throat pains and cold symptoms.

The present study aimed to determine seed germination, by using classical methods- on paper under layer, in Linhardt dishes and in blotting paper envelopes. Seeds were 1, 2 and 3 years old. The results show that seed germination of Agastache foeniculum (Pursh) Kuntze, is influenced by age and external factors (temperature and light). TP (Top of Paper) and BP (Between Paper) methods both influence the germinating faculty.

Keywords: Agastache foeniculum (Pursh) Kuntze, medicinal plant, germination, germinating faculty, germinating energy.

INTRODUCTION

Species form Agastache genus are part of mint family (Lamiaceae) and their flowers represent a lure for insects (bees, butterflies etc.) (Armitage and Laushman, 2003).

The plant is tall, vertical, reaching 5 meters height, in its origin zones. At the end of summer, it produces beautiful ears of violet flowers (Tudor, 2005).

The stalk is edged and fine and the leaves are jointed and bulky on the inferior side, having an anise flavour (Peterson, 1999).

Big hyssop common name (anise hyssop, huge hyssop) refers to the flavour of its external part (herba), very similar to the real hyssop (Hyssopus officinalis). The name also includes anise and sweet wood, which alludes to the perfume of different species (Armitage, 2006).

Big hyssop is considered, commercially, a culinary and aromatic plant, being used in tea mixes (Galambosi et al., 1992). It is seldom grown as bee fodder. Several varieties of this species were selected in Canada, for their essential oil, which contains methyl chavicol. The species was cultivated in Moldavia, as an experiment, for essential oil production (Galambosi et al. 1992) (Small E., 2006).

The herb (Agastache foeniculi herba) is used for therapeutic purposes in treating cardiovascular, nerve and gastrointestinal affections, in treating cold, fever (North America Indies used the infusion for this intent) and as a diaphoretic. It also has antiemetic,
antibacterial and antifungal properties. It improves throat pains and cold symptoms. Because of its content in Patchouli alcohol, patchouli pyridine, eugenic acid, cinnamic aldehyde, pogostol etc. it is recommended that those having a stomach condition take caution when using it, as usually the treatment should occur in a longer period of time. The Agastache infusion has a very pleasant taste and an effect similar to the Dracocephalum moldavica L (Phillips, 2002).

It is a rustic species, with little requirements towards environmental conditions. It’s origin zone is motioned to be in North America (Alberta state). It was brought in Europe as an ornamental plant and it is cultivated in East Europe (Great Britain, Holland, Germany). The plant has a preference towards sunlight or partial sunlight. It is resistant to moderate frost (up to -10° C, but only on a short period of time). Late spring frost can be damaging. Protection is recommended around stalk base, when severe frost is announced. It can be cultivated on any type of soil (including chalk and clay), but they have to be sufficiently drained (Fălticeanu and Munteanu, 2010).

Seeds sown at 21-22° C, germinate in 7-10 days (Armitage and Laushman, 2003).

MATERIALS AND METHODS

In order to establish data regarding seed cultural values, it was applied the STAS 1636/89 standard method for hyssop (Hyssopus officinalis L.) in what germinating energy and faculty is concerned. The germinating energy of Agastache foeniculum (Pursh) Kuntze seeds was determined at 4 days, while the germinating faculty, at 14.

Hence the variants were:

- Seed age (harvesting year) with following graduations: V1 = 2008; V2 = 2009; V3 = 2010.
- Germinating temperature with following graduations: V1 = 10°C; V2 = 12°C; V3 = 15°C; V4 = 20°C și V5 = 25°C.
- Light influence with following graduations: V1 = light și V2 = darkness.
- Method influence: V1 = TP; V2 = BP.

Seeds aging 1, 2 and 3 years represented the biological material originated in Jucu, at the Experimental Field belonging to USAMV Cluj-Napoca. The experience was conducted during 2010 and 2011, in Plant Growing Department laboratories, USAMV Cluj-Napoca. To determine seed germination of Agastache foeniculum (Pursh) Kuntze, Linhardt germinators were used, with a blotting paper germinating layer. Seeds were laid on 4 repetitions of 100 pieces for each variant (for TP method).

The determinations were made by using a MC 1000E device, built by Snijders, in Holland. During germination, temperature, air humidity and light were controled. Temperature values were the ones stated before. Relative humidity of the air was 80% and light devided into 11 hours of presence and 13 of absence (during winter).

For BP method, 100 seeds were used, laid on blotting paper envelopes, in 4 repetitions.
RESULTS AND DISCUSSION

Germinating values of *Agastache foeniculum* (Pursh) Kuntze influenced by temperature and age are presented in Table 1, and aspects regarding the experience in Figure 1.

![Image](https://via.placeholder.com/150)

**Fig. 1.** Seed germination of *Agastache Foeniculum* (Pursh) Kuntze

As the table shows, temperature and age have a neat influence upon germinating faculty. Hence, at 10°C, 2010 seeds have the highest germination (9%), in comparison with 2008 and 2009 seeds having the same percent of 7. 12°C temperature has a positive influence, especially upon 2009 seed, which germinated in a 71 percentage.

2009 *Agastache foeniculum* (Pursh) Kuntze seeds had a germinating capacity of 75%, being higher than the ones of 2008 (17%) and the 2010 (59%) seeds at a temperature of 15°C. 20°C temperature is most indicated for seed germination. At this temperature, the 2009 seeds had a 87% germination, while the 2008 a 17% and the 2010 a 34%. Germinating energy was 0 for all the temperatures.

It can be observed that maximum germinating capacity occurs at 2 years from harvesting (the 2009 harvest). Younger and older seeds that the mentioned age have a lower germination. This shows that post maturation of these seeds takes place in a 2 year period.

<table>
<thead>
<tr>
<th>Germinating temperature°C</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>7,0</td>
<td>7,0</td>
<td>9,0</td>
</tr>
<tr>
<td>12</td>
<td>17,5</td>
<td>71,0</td>
<td>52,0</td>
</tr>
<tr>
<td>15</td>
<td>17,5</td>
<td>75,0</td>
<td>59,0</td>
</tr>
<tr>
<td>20</td>
<td>16,7</td>
<td>87,2</td>
<td>34,2</td>
</tr>
</tbody>
</table>

Table 2 shows that germinating capacity values of studied seeds are influenced by germinating method- TP or BP- and by seed age. BP method gave better results in comparison to the TP method, both at lower and higher temperature, especially for 2009 seeds, where germinating faculty was 13% (at 10°C) and 89% (at 25°C). The lowest results were obtained for 2010 seeds.
According to the values showed in table 3 factors such as light and the age of the seeds are also responsible for the seed germination. Observations show that in 2008 seeds, the germinating capacity values were 17%, rising to a high 87% value in the second year then followed by a drop to a 34% in the third year (in presence of permanent light). In the case of exposure to permanent dark the phenomena was similar, only the values were different, 2008 (14%), 2009 (79%), 2010 (5%). The germinating temperature in this experiment was 20°C.

Tab. 2
Germinating faculty values (%) obtained through TP and BP methods for *Agastache foeniculum* (Pursh) Kuntze seeds, (Cluj-Napoca, 2010-2011)

<table>
<thead>
<tr>
<th>Method and temperature, ºC</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP</td>
<td>7,0</td>
<td>7,0</td>
<td>9,0</td>
</tr>
<tr>
<td>BP</td>
<td>11,0</td>
<td>13,0</td>
<td>17,0</td>
</tr>
<tr>
<td>TP</td>
<td>84,2</td>
<td>87,7</td>
<td>42,2</td>
</tr>
<tr>
<td>BP</td>
<td>89,5</td>
<td>89,5</td>
<td>69,0</td>
</tr>
</tbody>
</table>

Compared to years 2008 and 2010, 2009 seeds had a better germination rate in light conditions (87%) compared to the dark conditions values (79%). The dark had induced the only exception in which the seeds have germinated in 4 days making the germinating energy other than 0.

Tab. 3
Germinating faculty values (%) in *Agastache foeniculum* seeds (Pursh) Kuntze depending on the germination conditions (Cluj-Napoca, 2010)

<table>
<thead>
<tr>
<th>Light conditions</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG</td>
<td>16,7</td>
<td>87,2</td>
<td>34,2</td>
</tr>
<tr>
<td>FG</td>
<td>14,0</td>
<td>79,0</td>
<td>5,0</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Germination of *Agastache foeniculum* seeds (Pursh) Kuntze is influenced by age and external factors, among which the germination temperature and the light conditions.

The presence of light during germination has a negative influence on the germinative energy of the seeds, but permanent light stimulates the germinating capacity. Exposure to dark during seed germination stimulates their germinative energy.

Methods TB and BP also also have an influence on *Agastache foeniculum* seeds germination (Pursh) Kuntze, BP method ensuring higher germination values.

Regarding the age of the seeds, the best germinating capacity was observed in 2009 harvest. The post-maturation time of this species seeds is aprox. 2 years.

The maximum germinating capacity was registered at a 25ºC temperature, compared to the other tested temperatures.
REFERENCES