GEORGESON
BOTANICAL GARDEN
University of Alaska Fairbanks

Seed Germination of Bunchberry, *Cornus canadensis* L.

Dr. Patricia S. Holloway
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Georgeson Botanical Garden
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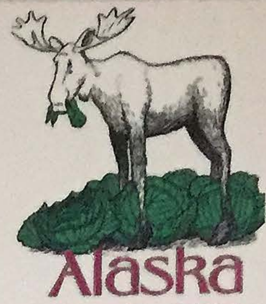


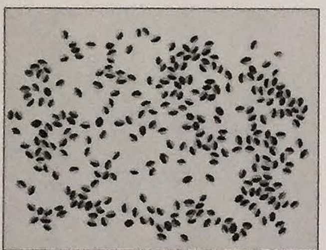
Introduction

Bunchberry is a semi–evergreen ground cover that is popular a landscape ornamental in northern latitudes. It is normally propagated by seed sown in the field in autumn or by stem cuttings. Seeds are dormant, and recommendations for afterripening treatments include combinations of cold and/or warm stratification and scarification for varying lengths of time.

With both field sowing and experiments in a controlled environment, germination percentages are not consistent and not high. Germination trials during the past five years at the Georgeson Botanical Garden have not yielded more than 50 percent germination. Our goal was to identify a seed treatment that would promote consistent and high germination percentages under controlled conditions.

Summary of current knowledge

* Seeds have a mechanical dormancy. A stony seed covering is present, and it is not impervious to water. This covering softens and falls off when seeds are in a moist medium.
* Seeds have a physiological deep dormancy that is partly overcome by a cold stratification period.
* Seeds have a chemical dormancy controlled in the pericarp. Seeds extracted from the fruit germinate better than seeds surrounded by the fruit pericarp.

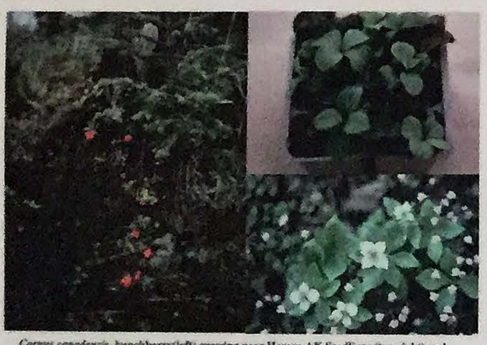


Seeds of *Cornus canadensis* showing a two–celled stone by X–radiography. Most stones have a single seed and one empty cell.

Objectives

Several experiments were conducted during 1996 and 1997:

1. Determine an optimum length of cold stratification period.
2. Determine if a leachable, water–soluble inhibitor is present in the seed,
3. Identify an optimum germination temperature between 5˚C and 30˚C.
4. Determine if light is a factor in germination.
5. Test the effects of 0 – 5000 mg/l gibberellic acid soak on germination.



Cornus canadensis, bunchberry(left) growing near Homer, AK.Seedlings (top right) and flowers (bottom right) of bunchberry.

The bunchberry is a drupe containing a two–celled stone.

Experiment 1

Fruit was collected from wild stands in September 1997. Fruit was frozen for one month, then seeds were extracted using a blender and air dried for 24 hours on a paper towel. Half of the seeds were stratified in moist sand at 4˚C. The remaining seeds were soaked in warm running water for one week prior to stratification. Seeds from both treatments were removed from stratification at monthly intervals and germinated on filter paper in petri dishes at 25C. Dishes were placed beneath cool white fluorescent lamps with a 16–hr photoperiod. Daily counts of radicle emergence were recorded for 30 days. The experiment consisted of three replicates of 50 seeds.

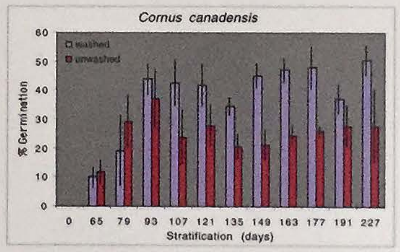


Table 1. Unstratified seeds of bunchberry did not germinate. Greatest germination percentages were recorded following 93 days of cold stratification for washed seeds and 79 days for unwashed seeds. Additional cold treatment had no benefit. Seeds washed in warm water for one week germinated better than unwashed seeds following 107 days of cold stratification.

Experiment 2

Seeds were collected, washed and stratified as in Experiment 1. After 163 days of stratification, washed and unwashed seeds were germinated on filter paper in growth chambers beneath cool–white fluorescent lamps(16–hr photoperiod). Temperature treatments were 5, 10, 15, 20, 25 and 30˚C. Daily counts of radicle emergence were recorded for 30 days. The experiment consisted of three replicates of 50 seeds.

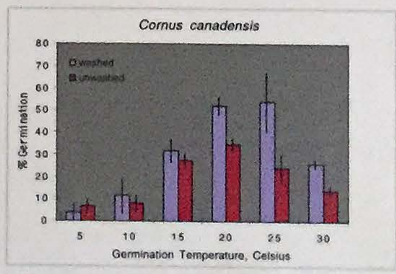


Table 2. Optimum germination temperature for washed bunchberry seeds treated with 163 days of cold stratification was 20–25˚C. Optimum germination temperature for unwashed seeds was 20˚C. Average

Experiment 3

Following 163 days of cold stratification, washed and unwashed seeds were germinated on filter paper, in growth chambers beneath cool–white fluorescent lamps(16–hr photoperiod). Three replicates of 50 seeds received the light treatment, and three were enclosed in aluminum to exclude light. After 30 days, total germination was recorded as radicle emergence from the seed coat.

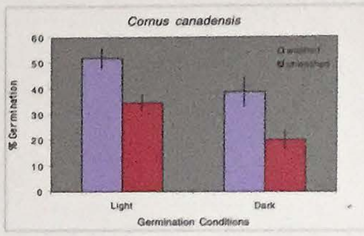


Table 3. Both washed and unwashed seeds stratified for 163 days germinated better in ligh than in darkness. Washed and tratified seeds that were germinated in the light was the only treatment to exceed 50 percent germination.

Experiment 4

Unstratified, washed and unwashed seeds were soaked for 24 hours in 0, 1000, 2000, 3000, 4000 or 5000 mg/l solutions of gibberellic acid (GA3). Seeds wer sown without rinsing onto filter paper and germinated in growth chambers beneath cool–white fluorescent lamps (16–hr photoperiod) at 25˚C. Treatments were replicated three times in a completely randomized design. Germination counts (radicle emergence) was recorded for 30 days.

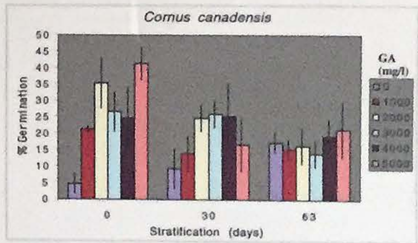


Table 4. All concentrations of gibberellic acid promoted germination of unstratified bunchberry seeds. The lowest concentrationfor optimum germination was 2000 mg/l gibberellic acid. No germination percentage exceeded 50 percent.

Conclusions

* Germination of *Cornus canadensis* was improved by washing the seeds for one week in warm water, stratifying seeds for approx 93 days at 4˚C and germinating seeds in the light.
* Germination was best at 20–25˚C.
* Gibberellic acid treatments can be used to replace a cold treatment in unstratified seeds.
* Germination percentages in all treatments did not exceed 50 percent.Therefore, other dormancy factors are present.
* Bunchberry seeds have a physiological deep dormancy that is only partly removed by cold stratification and gibberellic acid. A water–soluble, leachable inhibitor occurs in the seeds, but other dormancy factors are involved in controlling germination.
* This project re–affirmed the importance of cold stratification in seed germination of bunchberry and showed a positive influence of leaching and light. It failed to identify an optimum treatment for successful seed germination.

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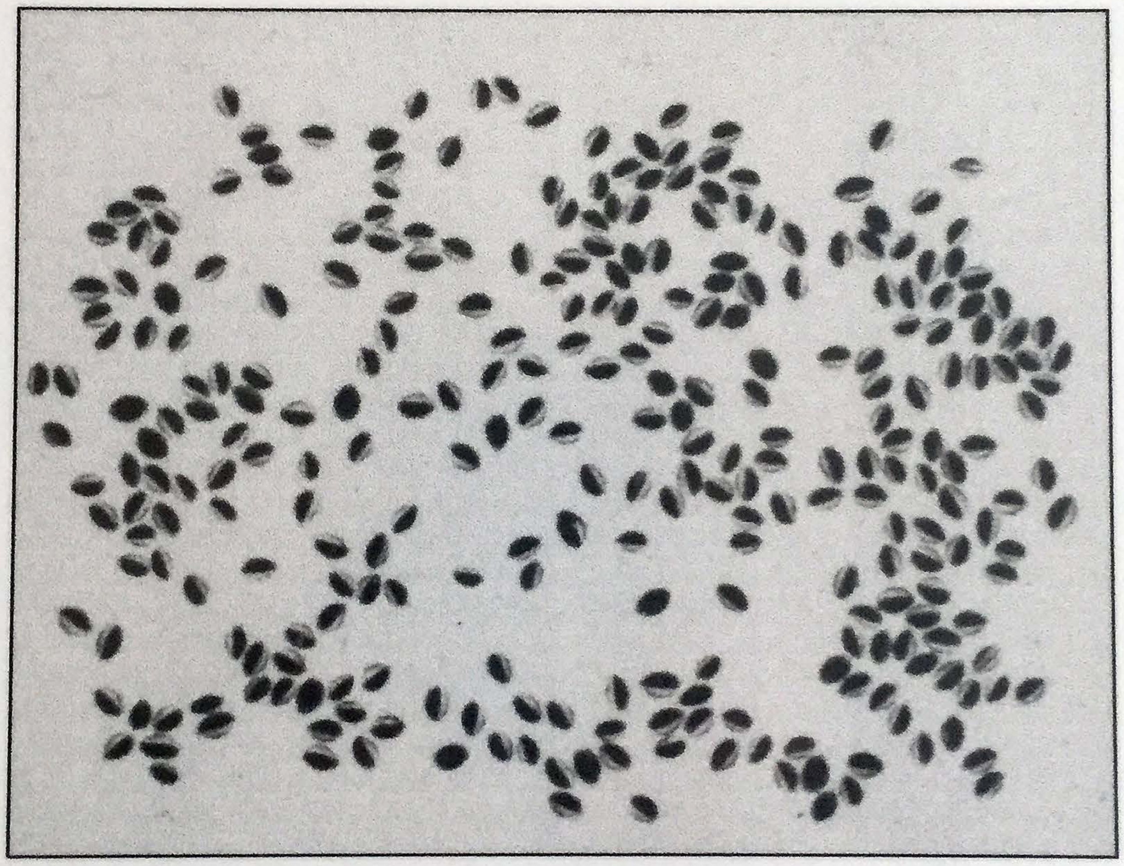

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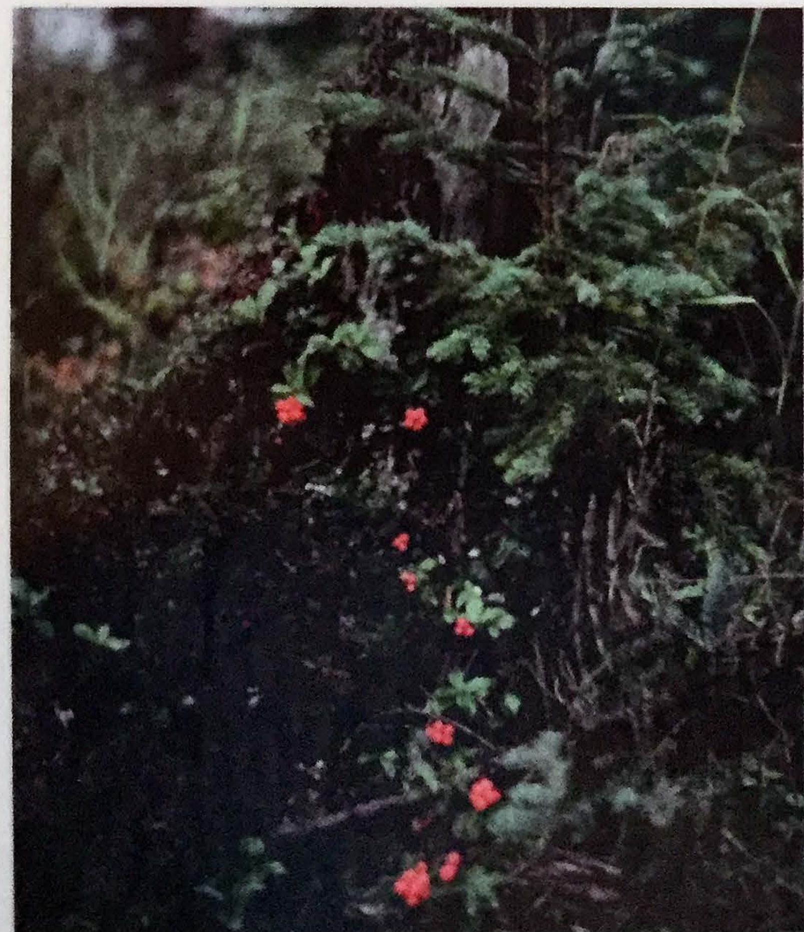

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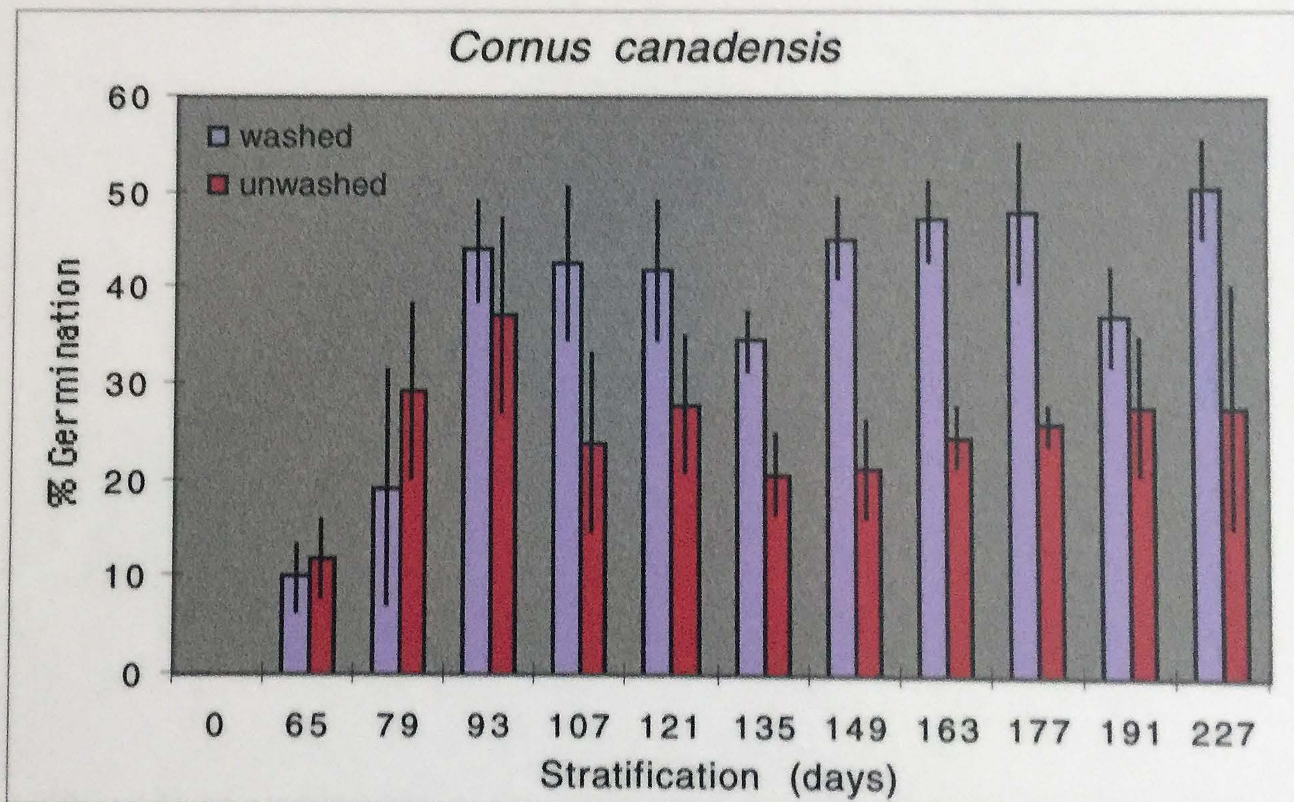

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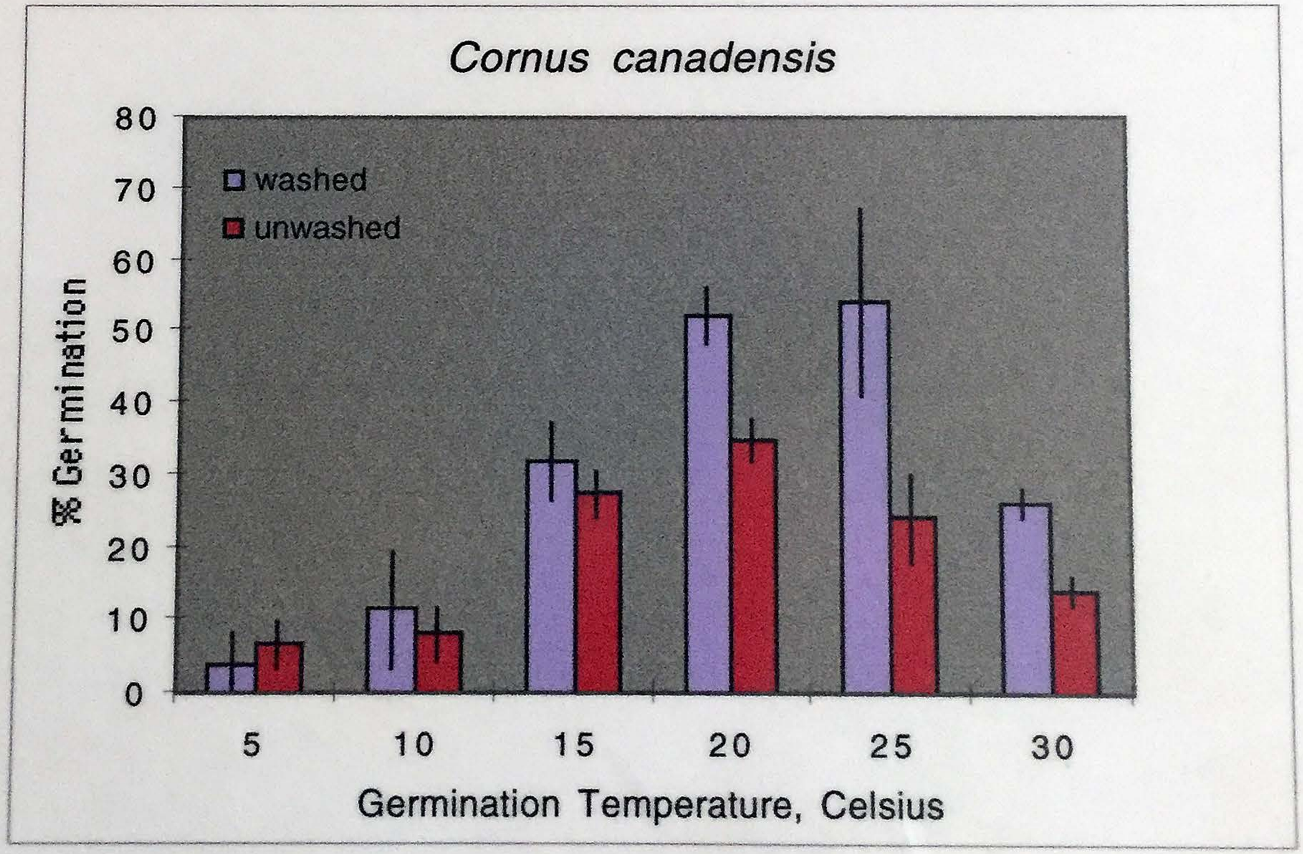

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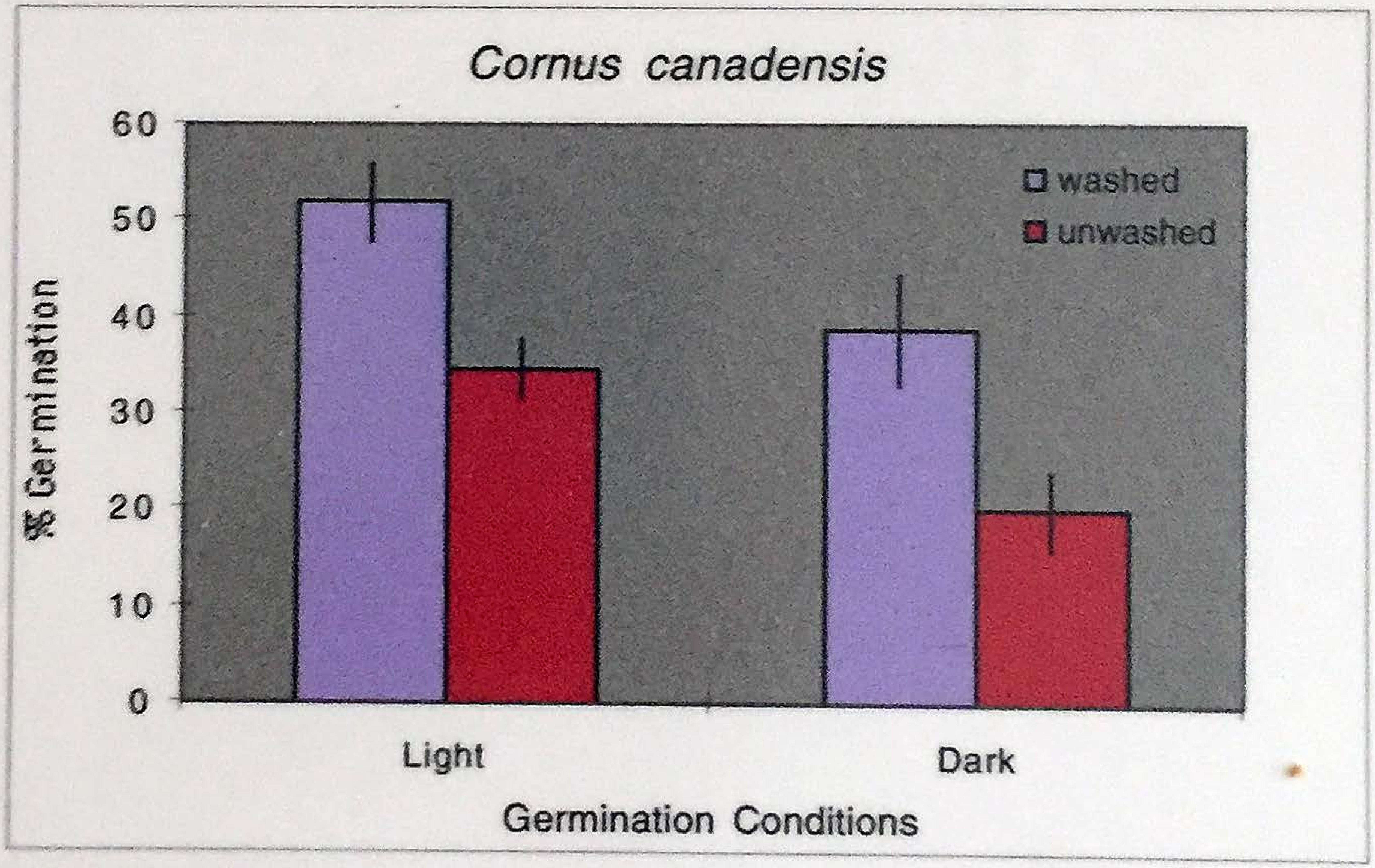

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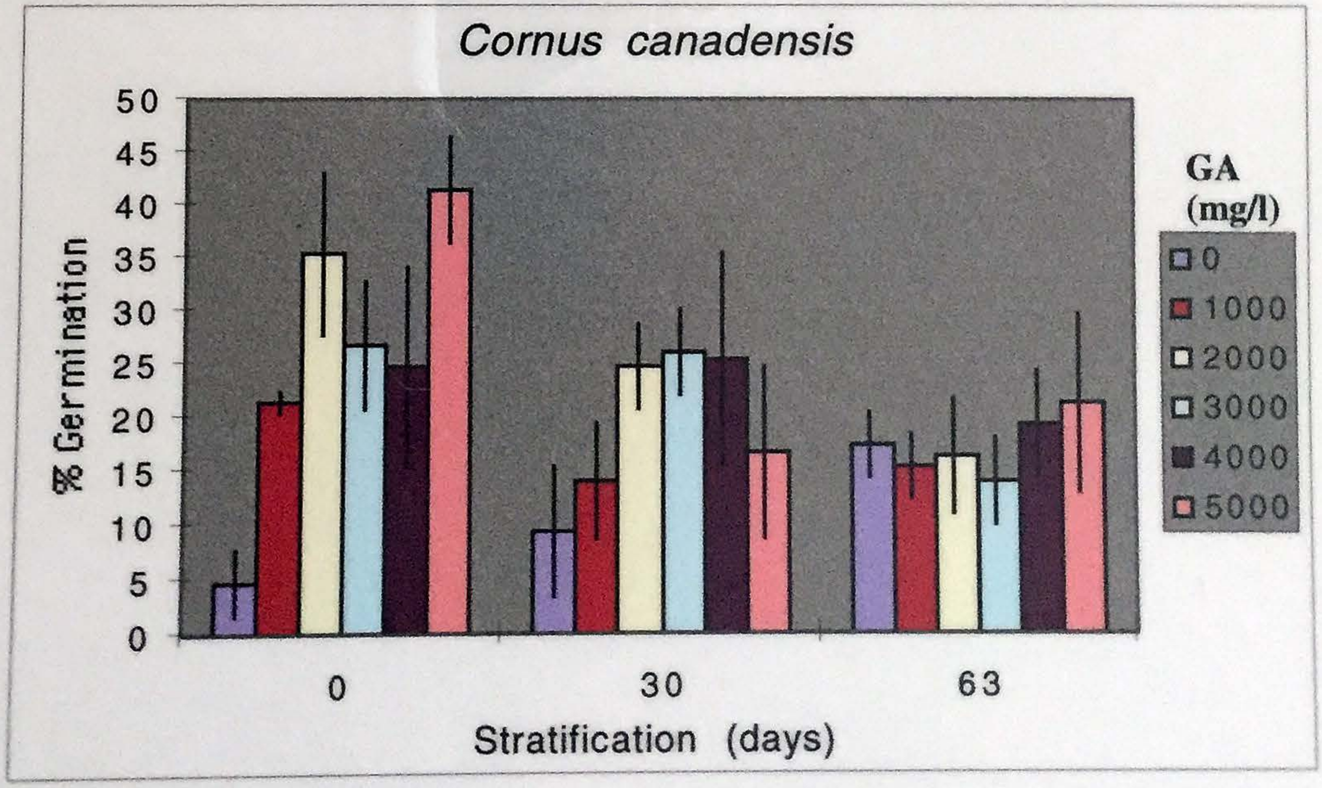

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