

Table S1. Methods and results from studies examining dormancy break and germination of *Bolboschoenus maritimus* (alkali bulrush), *Schoenoplectus acutus* (hardstem bulrush), and *S. americanus* (threesquare bulrush).

Study	Maximum germination percentage (treatment)	Treatments	Seed age (days)	Germination conditions	Populations collected (location)	Comments
<i>B. maritimus</i>						
(Clevering 1995)	98% (2-day soak in 4% bleach)	14, 28, 42, 240, 560, 1800-day cold moist stratification; bleach scarification	420; 730; 1980	Incubator; 12 h photoperiod; 30°C/5°C; 0.5 cm water	1 (Netherlands)	
(Fraissé et al. 1997)	6% (120-day cold moist stratification)	90, 120-day room temperature soak; 90, 120-day cold moist stratification; mechanical scarification	Not specified	20°C; moist	Not specified	Low replication; light conditions not specified
(Kaushik 1963)	85% (no pre-treatment)	salinity (4 levels); frozen in ice	Not specified	Incubator; dark; 35°C; moist	1 (Utah)	Methods unclear; low replication
(Kettenring 2016)	75% (1-day soak in 3% bleach)	30, 90-day cold moist stratification; bleach scarification	90; 210	Growth chambers; light; 35°C/18°C; moist	5 (Utah)	Some degree of intraspecific variation in response to dormancy break treatment
(Kreiberg 2000)	50% (NaCl soak an 14-day cold stratification)	14-day cold stratification; NaCl soak	Not specified	Not specified	Not specified	Methods unclear
(O'Neill 1972)	No quantitative data presented but, success reported	4-day bleach soak	Not specified	54-57°C	Not specified	Field report; no quantitative data specified or peer reviewed literature cited
(Tilley 2012)	no quantitative data reported	30-day cold moist stratification	Not specified	Suggest light, moisture, 32-38°C	Not specified	USDA Plant Guide; does not cite quantitative data or

peer-reviewed
research

S. acutus

(Isely 1944)	74% (90-day cold wet stratification)	90-day cold wet stratification; 180-day cold moist stratification; 180-day frozen in ice	Fresh; 540; 900	Winter photoperiod (Ithaca, NY); 30-32°C; moisture conditions not specified	1 (New York)	Low replication; seed collected from few plants; seed age not consistent
(Kaushik 1963)	70% (no pre treatment)	salinity (4 levels); frozen in ice	Not specified	Incubator; dark; 35°C; moist	1 (Utah)	Methods unclear; low replication
(Kellogg et al. 2003)	1% (cold stratification)	cold stratification (length not specified)	Not specified	Greenhouse conditions; 12 h photoperiod; 16-32°C; 2 cm of water	1 (Indiana)	
(Klausmann 1998)	59% (56-day cold moist stratification)	56-day cold moist stratification	Not specified	Indoor light; constant 24°C; moist filter paper	1 (Utah)	
(Muenscher 1936)	0%	60, 150, and 210-day cold wet stratification; 60, 150, and 210-day cold, dry stratification	Not specified	Greenhouse; 18-21°C/13-16°C; jars full of water	Not specified	Low replication
(Thullen and Eberts 1995)	85% (84-day cold wet stratification)	14, 28, 56, 84-day cold moist stratification; mechanical scarification	178	Incubator; 14 h photoperiod; 25°C/10°C	2 (Colorado)	Some degree of intraspecific variation in response to dormancy break treatment
(Tilley 2012)	Not specified	30-75 days cold wet stratification; 10% acid wash for 45 minutes followed by 75-day cold wet stratification	Not specified	Suggest light, moisture, 35-38°C	Not specified	USDA Plant Guide; does not cite quantitative data or peer-reviewed research
(Wagner and	54% (4-day, 0.05% bleach soak and 365-	182-day cold moist stratification; 365-day cold moist stratification; 1, 4, 5-	Not specified	Germination chambers; 12 h	3 (Utah); populations	

Oplinger 2017)	day cold wet moist stratification)	day, 0.05% bleach soak; mechanical scarification		photoperiod; 32- 38°C	were not compared
(Weiher and Keddy 1995)	83% (not specified)	Not specified	Not specified	Incubator; 12 h photoperiod; 25°C/15°C	Not specified

S. americanus

(Favorite 2002)	Not specified	Not specified	Not specified	3 cm of water in a cold frame	Not specified	USDA plant guide; does not cite quantitative data or peer-reviewed research
(Isely 1944)	67% (180-day cold moist stratification)	90-day cold wet stratification; 180 day cold moist stratification; 180 day frozen in ice	Fresh; 540; 900	Winter photoperiod (Ithaca, NY); 30- 32°C; moisture conditions not specified	1 (New York)	Low replication; seed collected from few plants; seed age not consistent, just differently aged seed lots
(Keddy and Constabel 1986)	20% (150-day cold moist stratification)	150-day cold moist stratification	155	Surface sown; greenhouse conditions; saturated moisture	2 (Ontario)	
(Keddy and Ellis 1985)	50% (30-day cold moist stratification)	30-day cold moist stratification	40	Surface sown; greenhouse conditions; -1 cm moisture	2 (Ontario)	
(Muenscher 1936)	1-2% (150-210- day cold wet stratification)	60, 150, and 210-day cold wet stratification; 60, 150, and 210-day cold, dry stratification	Not specified	Greenhouse; 18- 21°C/13-16°C; jars full of water	Not specified	Low replication
(Shiple and Parent 1991)	10% (270-day cold moist stratification)	270-day cold moist stratification	270	Phytotron; 15 h photoperiod 30°C/20°C	1 (Eastern Canada)	
(Wagner and Oplinger 2017)	34% (4-day, 0.05% bleach soak and 182-	182-day cold moist stratification; 365 day cold moist stratification; 1, 4, 5-	Not specified	Germination chambers; 24 h photoperiod; 32- 38°C	3 (Utah); populations were not compared	

day cold moist
stratification)

day, 0.05% bleach soak;
mechanical scarification

Table S2. Seed viability for *Bolboschoenus maritimus* (alkali bulrush), *Schoenoplectus acutus* (hardstem bulrush), and *S. americanus* (threesquare bulrush).

Population	Percent viable seed (mean \pm 1 SE)
<i>B. maritimus</i>	
BL	96 \pm 1
FB	96 \pm 1
SC	95 \pm 2
ST	62 \pm 13
<i>S. acutus</i>	
BL	86 \pm 3
FB	98 \pm 1
SC	93 \pm 4
ST	59 \pm 2
<i>S. americanus</i>	
Box Elder County	96 \pm 2

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