

From: Jeffglitz [<mailto:jeffglitz@aol.com>]
Sent: Tuesday, October 24, 2017 9:25 AM
To: Kunz, Michael <mkunz@email.unc.edu>
Subject: seed banking for *Agalinis navasotensis*?

Hello Mike,

I am in east TX presently attempting to get permission to collect a small amount of seed--if warranted--from *Agalinis navasotensis*. This plant is tremendously rare, known from 1 or 2 populations (there is a question about the second population), much rarer than *Schwalbea* but not listed as federally endangered. I am in contact with several knowledgeable folks including the lady who described and first discovered the species. Occurred to me the first priority is to collect seed for seed banking in case something should happen to the primary population which as of last Friday numbered about 200 individuals based on a quick inspection. There may be more, I have not visited the site myself, hope to get permission to do so shortly, maybe as soon as tomorrow.

I was thinking to collect 1-2% of the seed, perhaps 1 capsule (each plant produces many capsules) from 30 randomly selected individuals assuming at least 200 plants in the population. I may try to open the capsules to reserve a few seeds for my own use--there is a conservation oriented landowner not far away with favorable habitat who is enthusiastic to start a population, and also take some back to SCBG for a growing trial. The seeds I keep will likely not be sufficient to avoid founder effects but will give us some idea about the feasibility of new in-situ and ex-situ populations.

What do you think of these plans? Would you be willing to receive a collection of this species. I will fedex to you the morning after I collect. I should say it is an annual in case you don't know. Also all known plants are on private lands as is the potential introduction site.

Thanks, Jeff

From: Kunz, Michael <mkunz@email.unc.edu>
To: Jeffglitz <jeffglitz@aol.com>
Cc: Tiller, Anita <ATiller@hcp4.net>; Chapman, Suzanne <SChapman@hcp4.net>
Sent: Tue, Oct 24, 2017 3:36 pm
Subject: RE: seed banking for *Agalinis navasotensis*?

Hi Jeff,

Agalinis navasotensis is not a species I've worked with before. This species occurs close to our sister institution, the Mercer Arboretum, who has worked with seed banking in the past. I've cc'd Anita and Suzanne for your records. However, if seed collection happens this year, do send the seeds to me at NCBG as we'll store them until Mercer finishes cleaning up and getting re-established after the hurricane. Once they do, the seeds may be transferred back to them.

Anita did want to help you coordinate with the proper folks in TX. She writes:
"If in TX: he needs to at least contact TPWD rare species lead in TX, Jason Singhurst and would be a good idea to contact those I consider our leaders for the species in TX, our state FWS person, Dr. Chris Best and the prof. that named the species, Dr. Monique Reed."

If you need a resource in east Texas, Anita and Suzanne are great and have a lot of experience in plant conservation. Also, if you have resources to keep the capsules/maternal lines separate that would be fantastic.

Thanks and cheers,
Mike

Michael Kunz
Conservation Ecologist, North Carolina Botanical Garden
University of North Carolina at Chapel Hill
CB 3375, Chapel Hill, NC 27599 (mail)
100 Old Mason Farm Rd, Chapel Hill, NC 27517 (shipping)
General: 919-962-0522 Direct: 919-962-2378
mkunz@unc.edu www.ncbg.unc.edu

Subject:Re: seed banking for *Agalinis navasotensis*?
Date:Wed, 25 Oct 2017 07:11:10 -0400
From:Jeffglitz <jeffglitz@aol.com>
To:mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, keith@ravenenvironmental.com
CC:ATiller@hcp4.net, SChapman@hcp4.net, monique@mail.bio.tamu.edu, ghr@cyberclone.net

Hi Mike (and others),

Thanks for the response. I talked with Monique yesterday and had been in touch previously with Jason and Eric. If I understand properly the situation appears to be as follows. The main population was burned last year but Anita and Monique have not been able to go check due to illness or injury. However, in response to my question Eric took a quick look recently and reports a fairly substantial number of plants. Anita has an ex-situ population at Mercer. She and/or Monique were intending to make a collection of about 30 capsules to maintain the genetic diversity of the captive population. Since Anita and Monique have not been able to do so I volunteered to collect the capsules if Monique will give me the contact info for the landowner which she said she would do. As far as I can tell no one has been doing any seed banking but perhaps Anita will confirm or deny.

My hope was to be able to start a new field population on George Russell's land. George has spent his life accumulating and maintaining a wonderful conservation reserve managed with fire and with evidently appropriate habitat for this species (prairie, pine savanna, pine and post oak woodland, Catahoula outcrops). Eric has put together an extensive plant list for the property and I add a few species now and then. George's land is in San Jacinto county located equidistant between the two known *A. navasotensis* sites.

Monique tells me that Anita has germinated *A. navasotensis* only with difficulty in ex-situ conditions. However, this is an annual plant and must germinate under field conditions in order to maintain the population. This leads me to believe that field germination is to be expected if the seeds are put out at the appropriate time to receive the necessary environmental cues. Perhaps Anita will let me keep a few seeds from the 30 capsules to make a small trial this year. Or perhaps she can provide some seeds from her ex-situ population at Mercer for a slightly larger trial. If anyone or everyone is interested one idea might be for us all (excepting Mike who is in NC) to get together at George's, decide on a likely site for an

introduction attempt and perhaps discuss the methods for site preparation if any and documenting the results. I would certainly feel more confident if Eric, Jason and Monique were around to help choose an introduction site. George of course will protect the site in perpetuity.

Given this plant occurs on two known sites (two sub-sites in Grimes County plus the Tyler County site), both on private lands and (?) without any formal protections (is this correct or is there some sort of conservation easement or management arrangement on the Grimes site) it would seem that initiating new populations on protected lands should be part of a long term strategy for saving the species and George's land would seem to be a good candidate.

Since Monique has not yet sent the landowner contact info and no one has told me the location of the Tyler population I will go work on my plots in SHNF today. But if Monique or Anita will send the landowner contact for the main Grimes site and Eric or Jason will tell me how to find the Tyler site I will work on seed collections and/or additional searches tomorrow and Friday.

To emphasize, all seed will go to Anita unless she chooses to share. Mike, I will keep the capsules separate.

Thanks to all. FYI I will be in TX through Nov 4 or thereabouts but then I need to go back east.

Jeff

From: Jeffglitz [<mailto:jeffglitz@aol.com>]
Sent: Wednesday, October 25, 2017 6:17 AM
To: mkunz@email.unc.edu; jason.singhurst@tpwd.state.tx.us; keith@ravenenvironmental.com
Cc: Tiller, Anita; Chapman, Suzanne; monique@mail.bio.tamu.edu; ghr@cyberclone.net
Subject: Re: seed banking for *Agalinis navasotensis*?

One clarification--I told Eric that to begin with I will not get off the road at the Tyler site since no one seems to know the landowner there. I will just look along the roadside and for posted signs that might give us a clue who the landowner is so we can ask permission to go on the site. Eric says that if I can determine the landowner and obtain permission he might be able to come along Nov 3 to help check on the plant.

Subject: RE: seed banking for *Agalinis navasotensis*?
Date: Wed, 25 Oct 2017 17:39:02 +0000
From: Tiller, Anita <ATiller@hcp4.net>
To: Jeffglitz <jeffglitz@aol.com>, mkunz@email.unc.edu <mkunz@email.unc.edu>, jason.singhurst@tpwd.state.tx.us <jason.singhurst@tpwd.state.tx.us>, Best, Chris <chris_best@fws.gov>, monique@mail.bio.tamu.edu <monique@mail.bio.tamu.edu>

CC:Chapman,

Suzanne <Schapman@hcp4.net>, ghr@cyberclone.net <ghr@cyberclone.net>, keith@ravenenvironmental.com <keith@ravenenvironmental.com>

Hi, Jeff! Good to hear from you!

Mercer maintains an ex situ seed bank of the Grimes County population. Monique arranges access with landowner at Grimes county site.

It has been burned this year, Chris Best and Monique Reed have details.

Monique had foot surgery, I had back surgery. I am OK now. Monique, will let you know about her status.

Mercer does not have a seed bank from the Tyler Co. site. Jason, I suspect knows latest about landowner contact?

A collection of seed would be awesome!

As per Center for Plant Conservation (CPC) protocols:

If a seed collection is to be made, please collect no more than 10% of available seed: e.g., collect seed from every 10th plant.... Please keep the seed separate by mother plant...hopefully you will fill lots of labeled paper envelopes/packets! Please maintain seed at room temp at AC conditions, in paper to prevent molding...they mold easily if they are not kept under AC/dry air conditions.

Please make a herbarium voucher to document the collection,

image the plant and habitat,

get coordinates of the collection site:

Please fill out a TXNDD form shown in this link and submit a copy to TPWD and include copies with specimen and seeds.

https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/txndd/submit.phtml

As per reintroduction plans: please ask Jason Singhurst, Chris Best and Monique Reed if the site you mention is suitable as reintro site. They are most familiar with the species.

Please consult the 2012 CPC reference: *Plant Reintroduction in a Changing Climate* by Drs. Maschinsky and Haskins. Pay close attention to Appendix I.

If Jason, Chris and Monique feel reintro into a new county outside of its current county range is acceptable then:

- a trial using wild seed from the **one** site that Jason, Chris and Monique, feel is closest in characteristics to the San Jacinto site should be used.
- since the genetics of the species is unknown, use an equal amount of seed **from each mother plant** for the trial
- keep in mind, the plant species is a hemi-parasite and it is thought they are parasitic on prairie grasses. These are precious seed, please run a current literature search on Agalinis work. You should consider contacting these CPC groups that work with other rare Agalinis species:

Agalinis acuta: Bill Brumback with NE Wildflower Society (CPC) ;

Missouri Botanical Garden (CPC) Matt Albrecht: A. auriculata

and contact Chicago Botanic (CPC) Kay Havens: A. skinneriana.

Here is the website for CPC for more info:

<https://saveplants.org/>

It is so nice to have more hands on deck to help with this fascinating species!

thanks so much,

Anita A. Tiller, M.S., Botanist

Mercer Botanic Gardens

22306 Aldine Westfield Rd.

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fax: 832-927-0033

atiller@hcp4.net

<http://www.hcp4.net/Community/Parks/Mercer>

On 10/26/2017 7:08 AM, Jeffglitz wrote:
Thanks much Anita.

Monique has given me a location for the Tyler County site. I will go today and get as close as possible on the roadside and try to figure out who owns the site. Then perhaps Eric and I, or just I, can go back and make a collection later. Also I will spend the rest of the day rambling about Tyler County checking roadsides and public lands just in case lightning strikes. Jason if you know the Tyler county landowner and can share that info that would be great.

Also Monique has given me contact info for the Grimes County landowner. I will send an email today asking for permission to go tomorrow or whenever they feel is convenient while I am in TX. I will follow the protocols you list. Rather than worry about storing the seed myself the easiest thing might be for me to just deliver it to you at Mercer the day of the collection and you can deal with storage if that is OK. I will be on the road and in the field for a few more weeks and I do not want to leave the seeds in a hot car, motel room etc.

I have done a lot of work growing and starting new populations of federally endangered American Chaffseed, which is a somewhat similar hemiparistic species, but I will be sure to read up on all the Agalinis work, thanks for the leads on that.

Since you are storing the seed successfully it sounds like the best strategy might be not to rush things but to spend the next year or so (I will be back next fall to work in SHNF) deciding procedures for initiating a new population, selecting an appropriate site, getting input from all concerned, etc. Eric who is very familiar with both George's property and the *A. navasotensis* sites has indicated (Eric correct me if I am citing you incorrectly) that there is suitable habitat on George's land and that is the feeling I get from reading the two papers. I have years of experience in longleaf groundcover so I am very familiar with pineland habitats. I suspect I am qualified to select a new site but as I said I welcome help from Eric, Jason and Monique on site selection. Given the incongruities between the Grimes site and the Tyler site the feeling I get is that no one really knows the full range of habitats this plant might like to grow in.

Thanks again. Please be sure to let me know if it will be OK for me to deliver the Grimes County (and who knows, maybe some from Tyler too) seed to Mercer tomorrow afternoon or next week whenever I get permission to collect.

One last question--I am now confused about whether there is or is not an ex-situ population at Mercer. Can you enlighten me on that score?

Best, Jeff

Subject Re: seed banking for *Agalinis navasotensis*?

From George H Russell

To Jeffglitz, ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov

Cc SChapman@hcp4.net, keith@ravenenvironmental.com, George Russell

Date Today 09:09

I called Geyata yesterday afternoon and encouraged her to get her computer and e-mail up and running so that she can network with us and be in the loop. We have completed building her new office at our Institute for Strategic Biospheric Studies Field Station on the new 500 acre acquisition which is adjacent to our other 2,500 acres of botanical preserves. My wife loaned her a John Deere gator so that she can travel around the properties more easily and annotate which species inhabit the new acreage.

Perhaps one of you can help her get her computers up and running and I am computer illiterate.

Ghr

From: Tiller, Anita [<mailto:ATiller@hcp4.net>]

Sent: Thursday, October 26, 2017 4:41 PM

To: Jeffglitz; mkunz@email.unc.edu; jason.singhurst@tpwd.state.tx.us; chris_best@fws.gov; Monique Reed

Cc: Chapman, Suzanne; ghr@cyberclone.net; keith@ravenenvironmental.com; Duling, Darrin; Testa, Suzanne

Subject: RE: seed banking for *Agalinis navasotensis*?

Thanks so much, Jeff! Yes, please if you get permission to collect, we happily will process the seeds as additions for the bank Mercer maintains for the CPC's National Collection of Endangered Plants.

Please send me or Suzanne Chapman an email when you know the day you will be able to visit us at Mercer's research building, the Mercer Botanical Center. At times, we are offsite. You may reach us or leave a message with Suzanne Testa via 713-274-4200 between 8 and 4PM Monday to Friday.

Mercer's research building is not in the main botanic gardens area, instead, it is across from the gardens on the north side of Cypress Creek. The bldg. is at the corner of Aldine Westfield Rd. and Titleist Dr.

The address is:

22540 Aldine Westfield Rd.

Spring, TX 77373

In answer to your question, Mercer's ex situ seed bank includes Grimes County seed collections of *Agalinis navasotensis*. We currently do not have any plants of *A. navasotensis* in Mercer's CPC conservation nursery or on display in our public Endangered Species and Native Garden.

To help verify the species, when collecting seed, please snip off and include as much of the dry pedicel and capsule since I recall that *A. heterophylla* occurs at the edges of the *A. navasotensis* habitat at the Grimes site <http://botany.csd.tamu.edu/FLORA/NAV-OUTCROP/OUTCROPINTRO.HTML>another good reason to collect and keep the maternal lines separate.

I have not visited the Trinity site, and I can't remember if other *Agalinis* species have been reported there. Should you collect there, again please include as much of the pedicels and capsules for each maternal collection packet.

Have you, Eric, or other botanists visited Mr. Russell's land during *Agalinis* bloom and fruit time? Have other *Agalinis* species been seen there? Other *Agalinis* species could possibly hybridize with *A. navasotensis*.

Thanks again for your awesome assistance for the National Collection of Endangered Plants and for connecting with a generous landowner, Mr. Russell, with a promising reintroduction site. We at Mercer look forward to meeting you!

Sincerely, Anita Tiller

PS: Jeff, I am excited to hear and read more about your work with *Schwalbea americana* <http://www.bioone.org/doi/abs/10.2179/16-089> Please send us pdfs of your articles, if you don't mind!

Subject Re: seed banking for *Agalinis navasotensis*?

From George H Russell

To Tiller, Anita, Jeffglitz, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov, monique@mail.bio.tamu.edu

Cc Chapman, Suzanne, keith@ravenenvironmental.com, Duling, Darrin, Testa, Suzanne, George Russell, moo, Carlo Rodriguez, Sue Ann Delk

Date Thu 21:16

Just for the record, my wife and I have donated all 3,000 acres of botanical preserves to The Universal Ethician Church and to The Ethician Foundation so they are no longer our private properties. Around 1,000 acres are in perpetual conservation easements with the Texas Native Plant Society and another 1,000 acres are in perpetual conservation easements with NAPA which is now some other name after the death of Ned Fritz.

We were hoping to donate the other 1,000 acres but for some reason there is a demand for huge sums of money to protect the areas that we have personally spent multi-million dollars in personal funds to protect in perpetuity.

This makes no logical sense to me. We just sold assets and borrowed \$200,000 along with \$1,800,000 to purchase the 500 acres on which Geyata is living free at our foundation's expense so we do NOT have the funds to give to Texas Land Trusts to protect our remaining unprotected properties.

On the other hand The Ethician Foundation has protective covenants that give essentially the same perpetual protections as if donated to Land Trusts.

The main point is that unlike other PRIVATE PROPERTIES where rare plants survive, those properties will no doubt be sold off and developed in the near future which means that our 3,000 acres are very valuable as depositories of rare seed banks and rare species that no doubt lived on our properties in the past.

Ghr

Subject Re: seed banking for *Agalinis navasotensis*?

From George H Russell

To Tiller, Anita, Jeffglitz, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov, monique@mail.bio.tamu.edu

Cc Chapman, Suzanne, keith@ravenenvironmental.com, Duling, Darrin, Testa, Suzanne, moo, Carlo Rodriguez

Date Thu 22:14

Correction

Texas Native Prairie rather than Texas Native Plant.

Sub

jectRE: seed banking for *Agalinis navasotensis*?

:

Date: Thu, 26 Oct 2017 22:05:02 +0000

From: Monique Reed <monique@bio.tamu.edu>

To: 'Tiller, Anita' <ATiller@hcp4.net>,

Jeffglitz <jeffglitz@aol.com>, mkunz@email.unc.edu <mkunz@email.unc.edu>, jason.singhurst@tpwd.state.tx.us <jason.singhurst@tpwd.state.tx.us>, chris_best@fws.gov <chris_best@fws.gov>

CC: Chapman,

Suzanne <SChapman@hcp4.net>, ghr@cyberclone.net <ghr@cyberclone.net>, keith@ravenenvironmental.com <keith@ravenenvironmental.com>, Duling, Darrin <DDuling@hcp4.net>, Testa, Suzanne <stesta@hcp4.net>

The only other *Agalinis* on or near the outcrop is *A. heterophylla*. I've never seen a hybrid. It's extremely unlikely, I think. Some members of the genus have large chromosomes and others have small. I forget which is which, but those two species fall one into each group, making a successful crossing essentially impossible. It was one of the first things Judith Canne-Hilliker found out, thereby ruling out the possibility that what we thought was a new species was a simple edaphic variant of *A. heterophylla*.

I wonder, though, if *A. navasotensis* can be fertilized by *A. heterophylla*, with the resulting embryos failing to develop because of this chromosomal mismatch. That could certainly account for the high proportion of non-viable, shrunken/misshapen seeds in *A. navasotensis* capsules. Of course, that could be due to a lot of other reasons as well...

Monique

Subject: Re: seed banking for *Agalinis navasotensis*?

Date: Fri, 27 Oct 2017 00:37:56 -0400

From: Jeffglitz <jeffglitz@aol.com>

To: monique@bio.tamu.edu, ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov

CC: SChapman@hcp4.net, ghr@cyberclone.net, keith@ravenenvironmental.com, DDuling@hcp4.net,

stesta@hcp4.net

Anita, I have permission to go to the Grimes site tomorrow. My plan is to collect in the morning and just come down and deliver the seed to you all in the afternoon so I don't have to worry about them. My cell is 850-567-3503. Please send me a text if tomorrow afternoon will not work for you all.

It will be just the Grimes seed. I did go to Tyler today and will send a report and some photos later, bottom line most of the Agalinis were clearly not navasotensis but there were two plants I am still puzzling over. Part of the complication is they are done flowering so I just had the immature capsules to examine. Seeds are not yet mature so the seed characters also not that useful at this point. The two other Agalinis that have been mentioned at that site are oligophylla and fasciculata and they are both short pedicel species, so if I can assume the long pedicel ones are navasotensis that would simplify things. But I am not sure that is a legit assumption. In any case the seeds were not ripe so I did not collect any and there was not much of a sample with only two plants. I should say further that the good habitat and the plants I found were not precisely at the coordinates Monique sent but about 800 m to the south. But I'm not sure about the precision of those coordinates--if they are precise then there is no A. navasotensis at the site and it is no longer a longleaf stand, just recently logged and trashed one side of the road and young plantation on the other. However I am hoping the good area slightly to the south is the true location. I kept my promise to Eric and did not get off the road although I was sorely tempted. It would be good if we can figure out a landowner and arrange for a burn. I saw no posted signs and no clue to ownership. I flagged a log truck that was going by and asked but he said he had no clue.

I will send a couple of chaffseed pdfs shortly. Monique can you send me pdfs of your papers on the two A. navasotensis sites, i.e. Grimes and Tyler, I have been accessing through the biodiversity library links and cannot seem to figure out how to download permanent copies. Appreciate it.

My wife and I got married in Woodville, TX in 1980 (and now live in Woodville, FL). If only we had known to drive 15 miles NW to Chester.

Subject: other agalinis

Date: Fri, 27 Oct 2017 00:56:00 -0400

From: Jeffglitz <jeffglitz@aol.com>

To: jeffglitz@aol.com, monique@bio.tamu.edu, ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov

CC: SChapman@hcp4.net, ghr@cyberclone.net, keith@ravenenvironmental.com, DDuling@hcp4.net, stesta@hcp4.net

The only Agalinis thus far documented for the Russell site is heterophylla by Eric. I made a quick survey a few days ago and did not see any other species. Given Monique's comments there appears to be little chance of hybridization.

On 10/28/2017 7:50 AM, Jeffglitz wrote:

I went to the main Grimes site yesterday. I found only 40 plants, Possible I was spacing out and somehow missed plants or part of the burned section but I don't think so. Since Anita said I could collect from every 10 plants I collected 4 capsules--one from each plant-- although when I talked to her afterwards she said they normally don't collect from less than a hundred plants. Most of the capsules were not ripe, the 4 I collected were just beginning to open apically and hopefully the seed is mature. Since the number of capsules and seed that I collected was so small Anita said I could keep them and try to grow and germinate at SCBG. I think I will use the same methods we use on chaffseed and see what happens (this may be altered once I read more about *Agalinis* germination). Obviously if we do get some plants it will probably be too genetically limited for a real ex-situ population but at least we will know we can grow them.

I saw a fair bit of insect herbivory on the capsules--that could be one of the limiting factors.

After looking at the Grimes plants I am now fairly well convinced that the two long pedicel plants I saw at Tyler were in fact *navasotensis* so I think the plant still exists at that site also. (I have photos from both sites but my attempts to send seem to be overloading this slow connection. Will trend to send separately to Monique, Jason and Eric at least.)

I will be going back to Grimes one more time next week to check the smaller site. Also I left some flagging on plants where I had not yet collected capsules and I need to go back and remove the flagging. I talked to Mr M and told him I would be back and he said that would be fine.

As I said, I will follow up and try to figure out the Tyler landowner. Seems like someone should do genetics on these two populations given the differing site conditions.

Monique, Jason, or Eric, does anyone have population data for this species over time from the main Grimes site? I am wondering if it is a downward trend or there is just a lot of fluctuation? I am referring to years with fires in particular.

Copying to Patrick McMillan who is in charge at SCBG and Amy Blackwell who has been working with me on chaffseed there. (Patrick and Amy, since the eastern--i.e. Tyler County-- site is a longleaf stand, this species now supplants *Harperocallis* in my opinion as the rarest longleaf plant).

George, I thought about just putting out some seed on one of your Catahoula barrens but decided with this tiny amount of seed that we should try to grow some plants first. If we do get some plants I will plant a few next spring on your preserve after we burn this winter--I will come help with the fire,

Thanks to all for allowing me to get to know this beautiful plant and hopefully contribute to efforts to keep it around on the planet for a few more years.

Best, Jeff

Subject Re: seed banking for *Agalinis navasotensis*?

From George H Russell

To Jeffglitz, monique@bio.tamu.edu, ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov

Cc SChapman@hcp4.net, keith@ravenenvironmental.com, DDuling@hcp4.net, stesta@hcp4.net, pmcmill@clemsion.edu, amyblackwell@me.com, George Russell, carlo Rodriguez

Date Sat 08:27

Thanks Jess, for your dedication to preserving rare plants. Yes, I do believe that you should attempt to grow some before putting out seed on the appropriate site or sites on our botanical preserves.

ghr

Subject Re: seed banking for *Agalinis navasotensis*?

From Monique Reed

To George H Russell

Cc Jeffglitz, ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov, SChapman@hcp4.net, keith@ravenenvironmental.com, DDuling@hcp4.net, stesta@hcp4.net, pmcmill@clemsion.edu, amyblackwell@me.com, carlo Rodriguez

Date Sat 19:34

Didn't someone say they saw a great number on the Grimes outcrop earlier this season? Given that it is very late in the season and it's possible to walk right by a plant if it doesn't have open flowers, I'm not too worried. There are probably more. It's an annual and the total goes up and down by a factor of ten from year to year. 40 is more than we saw last year.

Monique

Subject RE: seed banking for *Agalinis navasotensis*?

From Eric Keith

To 'Monique Reed', 'George H Russell'

Cc 'Jeffglitz', ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov, SChapman@hcp4.net, DDuling@hcp4.net, stesta@hcp4.net, pmcmill@clemsion.edu, amyblackwell@me.com, 'carlo Rodriguez'

Date 2017-10-30 10:45

I saw about 40-50 when I was there week before last.

Eric L. Keith

Project Manager

RAVEN Environmental Services, Inc.

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Huntsville, TX 77342-6482

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6 Oak Bend Drive

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E-mail address:

keith@ravenenvironmental.com

Website:

www.ravenenvironmental.com

Subject RE: seed banking for Agalinis navasotensis?

From Tiller, Anita

To Monique Reed, jeffglitz@aol.com

mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov, Chapman, Suzanne,

Cc keith@ravenenvironmental.com, pmmcill@clemson.edu, amyblackwell@me.com, carlo Rodriguez, George H Russell

Date 2017-10-30 10:53

Hi, Jeff: Thanks SO much for visiting the site and collecting what you were able to collect! Please let Suzanne and me know how the propagation goes. Supplemental nutrients with your ex situ work in order to offset hemi parasitic needs sounds great.

Hi, Monique: Thanks for pointing out that hybridization is unlikely with *A. heterophylla* and that competition for resources, though, may be an issue. Good question about the sterile seed production. Lots to think about.

Look forward to good news from Jeff and a productive 2018!

thanks again, Anita

From: Tiller, Anita <ATiller@hcp4.net>
To: Jeffglitz <jeffglitz@aol.com>; monique <monique@bio.tamu.edu>;
mkunz <mkunz@email.unc.edu>; jason.singhurst <jason.singhurst@tpwd.state.tx.us>;
chris_best<chris_best@fws.gov>
Cc: Chapman, Suzanne <SChapman@hcp4.net>; ghr <ghr@cyberclone.net>;
keith <keith@ravenenvironmental.com>
Sent: Mon, Oct 30, 2017 3:37 pm
Subject: RE: other agalinis

Sorry, Jeff, I am rec'ing some emails out of sequence, so excuse the replies that are out of order! J

Also, you and I spoke on Friday, but please remind me, which greenhouse facilities will you use for the *Agalinis navasotensis* collected from Grimes Co.?
Will you be collecting some common *Agalinis* species seed and compare their growth with that of the *A. navasotensis* seeds?
thanks! Anita

On 10/30/2017 6:36 AM, Jeffglitz wrote:

Aureolaria flava is another new one for the list. NRCS site shows it as in TX but does not have any counties filled in.

Subject Re: aureolaria flava

From George H. Russell

To Jeffglitz, keith@ravenenvironmental.com, carlo Rodriguez

Date 2017-10-30 12:11

Great news!!! Now they will have a county to fill in.

Subject:RE: aureolaria flava

Date:Mon, 30 Oct 2017 10:58:36 -0500

From:Eric Keith <keith@ravenenvironmental.com>

To:'Jeffglitz' <jeffglitz@aol.com>, ghr@cyberclone.net

Listed on BONAP for San Jacinto County, but still a nice find.

Eric L. Keith

Project Manager

RAVEN Environmental Services, Inc.

Mailing address:

P.O. Box 6482

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Shipping address:

6 Oak Bend Drive

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Phone numbers:

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E-mail address:

keith@ravenenvironmental.com

Website:

www.ravenenvironmental.com

From: Jeffglitz [<mailto:jeffglitz@aol.com>]
Sent: Monday, October 30, 2017 6:19 AM
To: ghr@cyberclone.net; keith@ravenenvironmental.com
Subject: Lobelia puberula

Lobelia puberula has been added. It is in vicinity of another nice patch of Sorghastrum elliottii and Sporobolus junceus.

(30.82319, 95.24573).

Subject:RE: Lobelia puberula
Date:Mon, 30 Oct 2017 10:57:36 -0500
From:Eric Keith <keith@ravenenvironmental.com>
To:'Jeffglitz' <jeffglitz@aol.com>, ghr@cyberclone.net

Can't believe I missed that one. It's super common around here now.

Eric L. Keith

Project Manager

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keith@ravenenvironmental.com

Website:

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Subject: Re: other agalinis
ct:

Date: Tue, 31 Oct 2017 07:28:54 -0400

From: Jeff Gritz <jeffglitz@aol.com>

To: ATiller@hcp4.net, monique@bio.tamu.edu, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov

CC: SChapman@hcp4.net, ghr@cyberclone.net, keith@ravenenvironmental.com, pmcmill@clmson.edu, amyblackwell@me.com

Hi Anita,

It will be the greenhouse at South Carolina Botanical Garden (SCBG)/Clemson University where we have been growing Schwalbea and Patrick McMillan grows hundreds of rare plant species. Unless my strategy changes due to further literature searching I plan to try the same propagation methods we have been using with Schwalbea; standard potting media I use for longleaf groundcover plants (50% peat moss, 30% perlite, 20% vermiculite), 1 month cold stratification, in mist room till germination then transfer to regular greenhouse, fertilize with organic fish emulsion fertilizer--don't recall the nutrient composition offhand but can send later (Danny Gustafson at Citadel did some experiments and decided this worked best--I will send the pdf). With this protocol Schwalbea will grow fine even without a host. When planting out in the field I try to plant next to a host, preferably in the middle of a patch of Pityopsis graminifolia which is a favorite Schwalbea host. I need to get a better feel for the likely host of A. navasotensis. I was thinking of making some observations on closest neighbors when I go back to the site to collect the flagging I left out there. As Monique has mentioned many plants seem to be growing in very sparse vegetation surrounded by rocks so my guess is it will be the same situation as Schwalbea, they do not need hosts to germinate or grow but benefit if they can attach to the right host. Maybe what I will do is collect a mixture of available seed from closest neighbors and put that in with some of the A. navasotensis seed to see if it makes a difference.

But good idea about growing other Agalinis, I will collect some seed for several other species and we will give that a try.

One complication is that I ran into a deer or he ran into me last night on the way back to George's from SHNF and wrecked my vehicle probably beyond repair given that it has over half a million miles and probably is not worth the cost of the extensive damage. So my schedule is a bit up in the air at the moment while I try to replace my vehicle.

Thanks again to everyone,

Jeff

From: Tiller, Anita [<mailto:ATiller@hcp4.net>]

Sent: Tuesday, October 31, 2017 12:58 PM

To: Jeffglitz; Monique

Reed; mkunz@email.unc.edu; jason.singhurst@tpwd.state.tx.us; chris_best@fws.gov

Cc: Chapman,

Suzanne; ghr@cyberclone.net; keith@ravenenvironmental.com; pncmill@clemson.edu; amyblackwell@me.com

Subject: RE: other agalinis

Dear Jeff, thank goodness you are OK, so sorry about the accident with the deer!

We at Mercer appreciate the details you provide below for propagation protocols, many thanks for that, and we look forward to the pdf when you are able to send it.

Good luck with your search for a new vehicle, so sorry you are going through that ordeal.

take care,

Anita

Su
bj: RE: other agalinis
ct:
Date: Tue, 31 Oct 2017 18:32:33 +0000
te:
Fr
om: Monique Reed <monique@bio.tamu.edu>

:
To: 'Tiller, Anita' <ATiller@hcp4.net>,
: Jeff Glitz <jeffglitz@aol.com>, mkunz@email.unc.edu <mkunz@email.unc.edu>, jason.singhurst@tpwd.state.tx.us <jason.singhurst@tpwd.state.tx.us>, chris_best@fws.gov <chris_best@fws.gov>
CC: Chapman,
: Suzanne <SChapman@hcp4.net>, ghr@cyberclone.net <ghr@cyberclone.net>, keith@ravenenvironmental.com <keith@ravenenvironmental.com>, pmcmill@clemson.edu <pmcmill@clemson.edu>, amyblackwell@me.com <amyblackwell@me.com>

Jeff, so glad you (if not your vehicle) escaped serious injury! Hitting a deer is not fun.

A reminder that Judith Canne-Hilliker was unable to germinate *A. navasotensis* except on nutrient agar in a greenhouse. Much the same protocol as is used for orchids, I believe. If you can figure out a different way to do it, that would be awesome, but there are so few viable seed in each capsule, each one is kind of precious.

Monique

Subject: RE: other agalinis
ct:
Date: Wed, 1 Nov 2017 08:57:53 -0400
From: Jeff Glitz <jeffglitz@aol.com>
To: monique@bio.tamu.edu, ATiller@hcp4.net, mkunz@email.unc.edu, jason.singhurst@tpwd.state.tx.us, chris_best@fws.gov
CC: SChapman@hcp4.net, ghr@cyberclone.net, keith@ravenenvironmental.com, pmcmill@clemson.edu, amyblackwell@me.com

Hi Monique,

Might be some hope for the car yet it turns out.

Do you happen to know what else Judith tried and do you have a protocol or a publication for her methods?

One thing that gives me some optimism is that the same sort of stories circulated about Schwalbea, could not be propagated except by tissue culture, must be attached to a host, etc. All this turned out to be exaggerated so I would like to start simple and see for myself what does not work. How about if I start an initial trial with just 10 seeds? Also I need to get the seeds X-rayed at USFS Seed Lab in Macon to see if they are filled and viable. But sure, anything you can contribute from Judith would be very helpful.

Thanks, Jeff
