2024 Southwest Seed Partnership Annual Stakeholder Meeting Summary

9:00 – 9:10 Welcome & Introduction, Melanie Gisler, IAE

The Southwest Seed Partnership (SWSP) fulfills the need for seed in the southwest, a regional climate change hot spot, by facilitating a regional seed network in the southwest. The partnership was established in 2015 with a first seed collection crew in AZ and has grown over the past years, most recently delivering the tasks outlined in the 5-Year SWSP Strategic Plan. On the horizon, funding gaps have been filled and we will be developing a seed market analysis, seed planning, providing seed workshops and modules. Welcome to the Stakeholder Meeting- a space for network updates, learning, etc. Next year's meeting will be at the NNSC in Tucson! Thank you to our Steering Committee, who helped develop the seed user survey analysis and evaluated research on new accession building protocols.

9:10 – 9:50 SWSP Updates: Seed Collection, Processing, and Production, Gwen Wion, IAE

Overview of the Native Plant Materials Development process with the SWSP. Our collaborative model means each development activity is supported by a partner and any activity related to that partner goes back to that partner.

Collections: Seed collection begins with target species selection based on the partner's desired restoration functions (i.e. pollinator habitat, post-fire seeding, etc) and an evaluation of each species ecological & biological traits (i.e. life history traits, climate adaptability, etc) with a goal to include 5-10 target species (mix of workhorse grasses and forbs) per plant community. Our collections process starts with acquiring permits, scouting for populations of target species, and following the SOS protocols. Last year we had 12 collection crews as part of 9 collaborations within 8 ecoregions! (Link to read more on newsletter). In 2024, we will support 12 crews in 9 ecoregions. Though we have had some challenges including predictability of seed maturation and poor seed quality (low fill, insects, ergot), we have made 406 wild seed collections from 100 native plant species and trained 26 early career conservationists!

Processing: Seed Studio. Cool, dry seed storage in our humidity-controlled cooler in Santa Fe and in the process of purchasing one for Arizona. Seed-tracking. Production is the best way to increase the quantity of locally sourced SW seed, grown as a single species crop.

Seed production: Collaborative approach works for both small and large scale growers and benefits to farms include a diversified income, native plants increase on farm conservation, use of marginal farmlands, and uses agricultural practices better suited for climate change. Seed production in 2022-2023 includes 5 NPS fields, 1 FWS field, and 5 FS fields. We facilitate collaborative seed production

by seeds shares across partners, field shares split between two partners, or field adoption. Our new seed production in 2024 includes 10 more acres.

9:50 – 10:10 SWSP Updates: Collaborative Research and Restoration, Ashlee Wolf, IAE

Nine SWSP Restoration Projects have taken place in the last two years!
Project Highlights:

NM Meadow Jumping Mouse Restoration in Jemez Mountains. Lessons learned from this include a) plant delivery is challenging and taking care of plants before planting mitigates transplant shock, b) tools- dibbles are great in soft soils and augers are great, but get tangled. We are looking forward to monitoring in 2024 to see how plants fare.

River for Monarchs is a restoration initiative that seeks to improve monarch habitat at 14 sites along the Rio Grande River. It has education and outreach components at Sandia High School, PEnitentiary of New MExico Horticulture Program, and a PBS documentary (coming out April 19th). Lessons learned: 1) keep trying for funding if you're committed to an idea! 2) Flexibility and adaptability are key, 3) nursery capacity matters for huge grow-outs like this.

Four Forest Restoration Initiative: developing plant materials for understudy restoration leading up to restoration demonstration site using seed collected and increased in production. Lessons learned: 1) play the long game- native plant material development cycle takes time before seed-based restoration can happen at scale. 2) Be flexible- trying seed pellets to mimic seed-soil contact where seed drills can't be used. 3) Research project- save seeds, document, test, take a deep dive into species research.

What do you see as high priority research topics for native plant material use in restoration in our region?

- Application methods: Germination rate based on different seeding techniques
- Short-term planning: When to apply seed in sync with weather patterns. Comparing fall versus pre-monsoon seeding success (June/July)
- Speaking of weather forecasting- monitoring growth stage to know where and when to harvest seeds (https://droughtview.arizona.edu/ and https://www.usgs.gov/special-topics/monitoring-vegetation-drought-stress)
- Drought-tolerant forage for ungulates/ruminants in mountainous regions post-fire
- The influence of mycorrhizae on germination for certain species and how to apply said research to large seeding projects
- Flood irrigation in acequias and effects on crop yield

10:10 – 10:40 Southwest Region Native Seed User Survey Results, Gwen Wion, IAE

Takeaways:

1. Southwest seed users are limited by what is available on the marketplace
2. Organizations are moving towards seeding with greater proportions of native plant species
3. A majority of folks choose species for seed mix based on what is commercially available.
4. People really want more forbs! (*Asclepias subverticillata* most requested) Additionally, people want more drought tolerant species, species that produce seed heads for reseeding, and gypsum adapted plants.
5. Resources that seed users would find useful, include:
    a. Seed menus are needed for each region
    b. Planting establishment protocols and seeding rates
    c. A marketplace to find native seed sources (Native Seed Network website updates will take place in the next year for this)
6. Many stakeholders seemed unsure about seed quality and seed origin- What resources or training is needed to help SWSP stakeholders become more familiar with the importance of seed quality and provenance?

10:40 – 10:50 AM MORNING BREAK

10:50 – 11:15 Informing Plant Materials Development Using Knowledge of Life History Characteristics, Rob Massatti, USGS

The goal is to develop a wide diversity of plant materials - including diversity within species- to restore complex western landscapes. Seed-based restoration means we need to increase seed in agricultural production, all the while thinking through where developed materials will be used. The two methods include: 1. A single-source or 2. a mixture of wild-collected seeds. If mixing sources, you must do your research:

1. Is your species predominant reproduction method inbreeding? Ex. *Sporobolus cryptandrus*. Makes plant materials development easier because there are no outgreeding/gene flow concerns
2. Does your species have multiple levels of ploidy?- recommendation is to get tissue samples to test for this, and avoid mixing wild populations for production.
3. Is the species known to predominantly outcross?
    a. If the species is likely to hybridize (ie Globemallows) In the wild, avoid mixing populations if you aren't sure of their purity or putting hybrid individuals into seed production. The problem with hybrids is that their progeny is less predictable (not necessarily like either species or other hybrids) so you may end up with maladapted seeds produced.

11:15 – 11:40 Lessons From Five Years of RestoreNet Networked Restoration Experiments, Laura Shriver, USGS

RAMPS is a program designed to respond to rapid land use change and rapid climate changes. RAMPS is a 3-part collaborative approach to restoring ecosystems starting with partner engagement, research, and communication + outreach.

RestoreNet tests restoration treatments (across 7 ecoregions and 5 states) across environmental gradients. Results from restore net 1.0 Iin CO Plateau complex) explored seed surface treatments and outplanting. (Mixes included cool and warm species to compare adaptability). Results: cool mix did better than warm mix (during a period of high precip) and soil modifications resulted in 3 x higher seedling emergence, because they increased soil moisture in the face of unpredictable precipitation conditions. Plant traits need to be taken into consideration for restoration. Successful traits include dense leaves, thin roots, and trait variation is restricted in the most arid sites, so matching traits to the environment may improve outcomes. RestoreNet 2.0 explores soil inoculation from intact sites, boosting soil in grow out, and applying during seeding.

11:40 – 12:00 The Dine' Native Plants Program (DNPP): Native Plant and Seed Production on the Navajo Nation, Dondi Begay, Diné Native Plants Program

DNPP was created due to lack of availability of locally sourced native plant material on the Navajo Nation. They are building a seed bank representing all of the genetic diversity within the ecoregions of the Navajo Nation. Production goals honor the cultural context of plant material, respect the reality of Dine' farmers, and establish a seed production network of native farmers on the Navajo Nation and in the four corners area. Their goal is to build a network of Navajo farmers/seed producers to meet the demand for native seed. Seed increase fields include weed barriers and drip irrigation, but this is not very sustainable or scalable to conditions on the Navajo Nation, and the upfront costs are beyond the start-up capacity of your average Navajo farmer. Plasticulture challenges include plants outgrowing holes in weed cloth and holes restricting plant growth and causing mortality. Flood irrigation is more accessible to farmers, but unfortunately, the flood irrigation washed out transplants. So, they reworked the model to combine plasticulture with flood irrigation and planted on the mounds (traditional row cultivation instead of in the furrows), so still needed high initial capital investment and created waste- they will need to continue to explore more sustainable methods. Additionally, DNPP is building a facility for processing native-produced seed. They are excited about bulking up their seed inventory. Awarded a large amount of funding from BLM to expand into 2 acres providing an opportunity to experiment without plastic (some drip to establish) and hand-build cultivators for weed management.

12:00 – 1:00 PM LUNCH BREAK

1:00 – 1:20 Updates from the Arizona Native Plant Society Native Seed and Plant Materials Committee, Anita Thompson Arizona Native Plant Society & University of Arizona

- The Arizona Native Plant Society (AZNPS) Seed and Plant MAterials Committee is new and starting to figure out their role in this realm; The committee approved by AZNPS in 2023. They met in January 2023, with representatives from many organizations focused on native plant material development. And, they held regional discussions at the National Native Seed Conference. They have decided the committee should be in alignment with the mission of AZNPS; meetings at 8am on the first Friday of the month (April 5th is the next meeting!).
- AZNPS has a series of chapters throughout the state. Anita started White Mountain chapter and is still their education coordinator. Anita handles farmer support, business/economics, and seeds; does research relating to native plants (ex: seed law has a big disconnect in the process of cleaning, determining ownership, locality scale); her area of interest is high elevation over 3k ft (AZ plateau, Mogollon Rim, White Mts).
- She is also a farmer - Double T Bar Farm ~2 acres in Taylor, AZ; has experience with funding challenges - farm service agency (FSA) land loans don't support native plant/seed as a valid crop and land prices favor developers.
- Discussions from the committee's first meeting: wild collections need more support, important to train volunteers on seed/plant scouting, support for seed crew harvest, information sharing on best management practices/germination strategies, education for farmers, citizen science, and need to work with a lack of general understanding and considering different learning abilities and backgrounds in outreach.
- Current committee projects for AZNPS: native seed libraries in AZ (4 current ones, hope to add 4 more!), media outreach to the general public (how to pick natives for your area, recognizing that national suppliers are usually not locally sourced, planting native flowers instead of African Daisies), sustainable and ethical wild seed harvest workshops - better solution than telling people not to harvest at all; seed cleaning workshops, a free Certified Native Plant Habitat program, botany workshops, seed increasing fields with education tie-in at botanical or public gardens.

1:20 – 1:40 Update from Central Arizona Conservation Alliance and the Sonoran Seed Collaborative, Challie Facemire Desert Botanical Garden & Central AZ Conservation Alliance

- CAZCA - collaboration of over 90 partner organizations, emerged from 2012 Desert Botanical Garden Strategic Plan, and in 2016 they developed Regional Open Space Strategy
    - Goal to ensure supply of genetically appropriate native plants for restoration
    - Tovrea Castle Pilot - culminated in a Seed Summit to collaborate on focus for native seeds in the region in the future

- Sonoran Seed Collaborative - impetus for the pilot and now and now 17 partner organizations working on this!
    - Their strategic plan - communication and collaboration, addressing research and knowledge gaps, projects to address regional stakeholder needs
    - Projects - propagating willow and cottonwood trees, creating seed balls with educational outreach
    - Desert Botanical Garden Seed Lab - testing dormancy and viability, in 2020 canelo hills ladies tresses orchids. Endangered plant propagation funded - currently in vitro
    - 5 year grant to grow Saguaro cactus, including seed photography for science and public outreach
    - Seed banking for long term Sonoran species conservation (and other deserts)
        - Saguaro Seed Germination - rooting biomass and seed structures
- Natalie Melkonoff with the Great Milkweed Grow Out - research, outreach and education, and native plant propagation
    - Propagation - seed collection, germination and emergence testing, grow-outs, seed amplification, developing strong propagation protocols
    - Partnering with schools, community centers, nonprofits, government agencies, tribal partners, plants funded in a way that means they can be donated to projects - contact them as a resource in the area for those types of projects
    - Research - on and off site field experiments to look at plant supporting insects
    - Arizona Monarch Collaborative - new group in 2019, 80 organizations together in a platform for collaborative conservation and communication, response to WAFWA Western Monarch Butterfly Conservation Plan, 3 committees meet monthly for research/info/monitoring, management/outreach, restoration/plant materials

1:40 – 2:00 Desert Seed Resource Center Kara Barron Desert Seed Resource Center

- New organization founded in 2021, a non profit based in Safford, AZ working on improving availability of native plants for conservation of the desert southwest. They are volunteer run with plant, policy, and educator backgrounds.
    - Seed curation for Gila Watershed partnership
    - Sonoran Seed Collaborative - co-chairs with City of Phoenix Parks, they are focused on Maricopa and Pinal counties in AZ (goals include responsible recreation and restoring degradation on small budgets), developing shared target species list from stakeholder survey.
    - Seed Orchard - collaborating with Eastern AZ College and Gila Watershed Partnership, the orchard is at Discovery park in Safford, 160 sq ft plot with 2 species and room to expand, public facing/educationally focused.

        - Seeds go to GWP
    - Grower outreach - workshops in Garham and Greenlee counties, they are planning a feasibility study and listening session with farmers/potential growers to see what they need to get on board, taking AZ water challenges into consideration (growing annuals in yearly conservation acreage, etc).
    - 2024 goals - expand capacity for seed orchard, wild seed collection with EAC on small scale, partner with local growers.

2:00-2:10 PM AFTERNOON BREAK

2:10 – 4:00 PM Grower panel featuring southwest-based native seed producers

Purpose: find out more about native seed production and how we can support growers.
Consider: What are the challenges and benefits to growing locally-sourced seeds and diverse species and genetics? What are the challenges and benefits of production operations of various scales?

Tren Hagman – Granite Seed Company

- Locations in California, Utah, Colorado
- Part of the Native Seed Group, which services large and small scale projects and customers from Kansas to the west coast; contract collections and grow outs, local ecotypes, cultivars, and speculative; grasses, forbs, shrubs, annuals/perennials
    - Bruce Seed Farm in MT
    - L&H in Washington, smaller local ecotype fields as well as named cultivars and native forb production
    - Hedgerow Farms in CA, strictly local CA ecotypes and small field production (fields divided by ecotype/collection site)
    - Star Seed in KA
    - Small farm in northern Mexico for AZ production of forbs and grasses

Brett Bamert- Bamert Seed Company

- President of Bamert Seed Company
- Muleshoe TX, family owned and operated, producing seed since 1951
- Native grasses, forbs, and legumes; 120-150 ecotypes/varieties grown, sell over 400 species
- Niche in native seed market - over 130 production, clean all the seeds they produce, custom production fields and they create site specific custom seed blends - seedspec.com to help landowners find their area of interest and the appropriate seeds
- Sell seeds adapted to TX, eastern NM, eastern CO, OK, KA; customers are private sector - ag producers, oil and gas, renewable energy, etc.
- Field sizes 0.5 to 260 acres, 102 fields

- Changes in the last 5 years - expanded into the contract production world, continuing to work in that

Robby Henes – Southwest Seed

- Newly into contract growing
- Family business since 1978, 750 acre farm in SW CO, produce native grasses and wildflower; custom grow-outs for wide range of situations, maintain 5-7 specific grow-outs per year for various agencies
- 20 different species, medium and large fields, small # of acres dedicated to custom production, seed cleaned and processed in house for process control and guarantee seed quality.
- Niche - The Beach Farm at 6200' elevation with silty clay loam
- Sell to homeowners, oil and gas industry
- Water costs mean water needs determine production choices
- Grow mostly warm season grasses and a variety of forbs (wildflowers helps with weed management)
- Four corners states and western states, work deeply with buyers on consultation; homeowners/farmers/ranchers, reclamation/restoration, specialty growout work, 60% jobber and federal states
- Snow dependent for determining acres and crops; 15-30 a year, specialty growouts require a lot more attention
- Production decisions based on farm factors (weeds and water, field separation) as much as economic and demand factors
- SWS moving towards a slightly larger focus on specialty growouts and ecotype production contracts - have to follow through, difficult situation if the crop doesn't turn out, hard to predict the many factors
    - Hit or miss business, worthwhile but difficult to determine the future

Sydney Anderson – Curtis & Curtis Seed

- Family business since 1956, third generation, moved from Forrest to Clovis, NM
- Vision to leave the land better than we found it, maintain principles while innovate within the industry
- Annuals and perennials, warm and cool seasons species (niche is warm season esp blue grama), cultivars and local ecotypes, local harvest in TX, NM, CO, and more in the SW; hand collection of forbs and shrubs
- Customers - private landowners, gov agencies, export, business to business, renewables, other reclamation work
- Changes - technology is evolving, modern marketing in outreach and getting consumers involved in their mission/abilities
    - Challenges - COVID, drought

- Custom form on website - sign your seed match - allows for tailoring right species or mix

Perin McNelis – Borderlands Restoration Network, Native Plant Program

- Nonprofit, smaller scale right now, dedicated to ecological restoration in AZ-Sonora borderlands, other programs work on watershed restoration/erosion control and community education
- 60 acre farm, 6 greenhouses, seed processing and storage facility, 1.5 acres under production
- Locally adapted seed and container plants for revegetation, restoration, and home gardening
- Public and private land managers, work on a grant and contract basis and public sale of native plant materials
- In the process of buying the farm!!
- Producing native seed for 3 contracts
- Collect all the foundation seeds unless a project provides it from a specific site
- Have produced 30 species, 6 for contracted production, rest for commercial, 4 grass species and the rest are forbs
- Irrigate for establishment and dryland afterwards (supplemented in droughts)
- NFWF Monarch and Pollinators grant for milkweed production - expansion this year
- Benefits of native seed farming: Lowers costs and reduces pressure on wild populations by farming native seeds. Returning fallow ag land to production reduces dust and invasive species, provides habitat and nectar sources for pollinators
- Challenges: managing weed pressure primarily, all organic so no pesticides/herbicides, weed cloth works but not for expansion; variation in productivity year to year for some species; strong fall winds can disperse some species prematurely; limitations of manual establishment and harvest - no mechanization yet.
- Looking forward - planning to get a tractor and seeding implements, expand production to 20-30 acres in next 10 years, mitigate weed pressure with intensively managed sheep grazing, increase seasonal workforce in fall to help with harvest

Justin Brereton – Fieldhouse Farms

- Chino Valley AZ - middle elevation just below 5000’
- Background - interested in Penstemon and other natives, nursery work, plant sciences at U of AZ, botany work in CA, head grower for Northern Arizona Nursery, which was a time for experimenting with containerized natives, pursued masters degree and now work as an educator (horticulture instructor)
- Family farm started in 2017, contracted 3 years with IAE starting in spring 2021, renewed contract and started new fields in 2024 - planning to track seed field time commitments better in the future.
- Other crops - home gardens, small animal pastures, head-trained wine grapes, agave field, container gambel oak

- Benefits of native seed production - disturbed land - this is a way to restore the property, some crops now outcompete existing weeds, contract with IAE helps focus efforts, initially deemed as starter income for other business but the focus has switched to expanding native seed.
- Challenges - overthinking available data vs unique growing conditions, small scale production is a difficult when lacking necessary equipment etc, unique climate at farm, gophers that chew through drip tape, pushing plants too hard makes them less hardy in tough environment - how to best come through in contract, isolation in a small industry, not a full-time job for the foreseeable future.
- Irrigate in the first season, then manage watering scientifically afterwards for dryland climate.
- Next steps - small step expansion by adding 4 species, one acre, getting extra help, water usage limitations on a residential well, equipment needs scaled up with field size.

Audience Questions for Growers:

- Do any of the commercial producers grow pesticide-free seed? Especially given that pollinators are especially sensitive to such chemicals?
    - Perin - Borderlands does as a small producer

- To all growers— I noticed that most of the seed production fields appeared weed free and you were not using any plastic/cloth of any kind. What are your methods to prepare the fields for planting and for irrigation? Is it possible to prepare fields in an organic certified manner? What kind of machines are used to harvest— are you using research plot combines or full size?
    - Perin - Borderlands is not organic certified at the moment - certification may not exist for source identified native seed. They use landscape fabric for their small plots and will deal with more weed pressures/solutions without it as they scale up.
    - Brett (Bamert) - we have an extensive herbicide program to manage weeds - pre and post herbicide applications, don't use many insecticides (and only on grasses), hand hoe rows as well, without it they would have to use plastics or hoe crews (already doing 3-7 times a year with herbicides)
    - Walter Hennes (Robby's brother, Southwest seed) - do use herbicides and only insecticides when needed - preparing a seedbed organically would be possibly, trouble would be in keeping it clean when its growing
    - Tren (Granite Seed) - tilling is another method for weed control, still labor intensive and herbicide is cost-wise easiest to utilize on large scale production fields
    - Robby (Southwest Seed) - weed pressures difficult to control - seed tests show how much weed % is allowable
    - Sydney (Curtis and Curtis) - same boat, depends on the species and field and size and seed test

- Walter (Southwest Seed)- some species (like blue grama) are really competitive and once established will hold its own, other species won't
- Brett (Bamert)- best thing to reduce weed pressure is start with a really clean field - produce a row commodity crop on the acres for 3-5 years before native crop to reduce weed pressure
- Justin (Fieldhouse Farms)- small enough production to use weed fabric, but the weed species in particular would grow around that, did annual production and some more creative methods. Perennial elymus turns into a mulch when mowed, decreases weeds year by years. Insects not a huge concern but grasshoppers were causing problems last year, close to needing intervention

- What recommendations might you have for a small grower 35 acres size who wants to begin with one or two crop productions?
  - Sydney (Curtis and Curtis)- customers doing this have specific circumstances - a desired species, water and field size considerations, etc. Industry pricepoints vs ease of establishment is a contention. Achievable but requires more details.
  - Perin (Borderlands) - also more questions about what they'd be trying to do; landscape fabric is a good system for doing something really small. Drip tape a great combo with that.
- Does anyone utilize ag cost share programs through NRCS, Farm Bill programs, etc? How impactful are they to improving your capacity?
  - Brett - Bamert does not, but they have some other equip programs.
- Since most of us purchase from the larger seed suppliers (Granite, Bamert, Curtis & Curtis), this question is directed to the larger growers. Can you please talk about your seed testing process? Including how you select the seed sample for testing, for a single seed test batch sample what is the maximum batch size covered, how do you select a seed test laboratory, and any other information of interest.
  - Tren (Granite)- # of bags per lot depending on pounds; lab selection - historically who they trust with a species (match southern species to regional labs etc); certain requirements for certified lots or source ID lots may need state labs based on where the farm or collection
  - Brett (Bamert) - easiest time to get a good sample is when processing/cleaning and bagging - get a handful from every bag and mix it up at the end and send it in.
  - Robby (Southwest Seed)- specialty grow outs - specific region/project for a collector - collectors are well-trained on collection but have gaps afterwards on how it's treated etc - more knowledge needed on what people expect from growers
- What would you like seed buyers to know?
  - Robby - if they're from a federal/state agency doing a project on public lands, testing is important for people to understand what the results mean, easy to get lost in details or appropriate species that may have not been grown out before successfully, species may

be available only in a really small region so you have to either get permissions or redirect buyers to what is actually available - ultimately be prepared to work WITH the grower/company as to what will work/is available, their help is valuable in making projects realistic
    - Sydney - both bigger and smaller wants from customers, we ask a lot of questions to help determine what would be best for them, any information they can give will be taken into consideration, seed tag reading and literacy is very important
    - Tren - agree on both points, gov type project/customers get a lot of requests for certified weed-free seeds, no such certification exists, seed companies are governed by state noxious weed seed list, that's what labs look at when testing. Other weed requirements on projects need to be specified up front so growers can match those requirements as early as possible.
- What successes and challenges have you had growing from diverse accessions and multiple source populations?
    - Brett (Bamert)- blue grama from 10-12 populations around NM, the first year it looked great but seeds were all empty, second year same results, suspected a ploidy difference causing sterility.
    - Walter (Southwest Seed) - SW Seed has had more challenges than successes. We work with a lot of hand-collected local ecotypes that local offices were hoping would work. Sideoats grama with IAE - found some challenges. Got a western wheatgrass that they found to be under producing, had never been tested - all rhizomatic growth and produced no seed. Cultivars have already had these things determined by the government, growers have to discover issues themselves with natives.
- What do you do about dormant seeds or difficult germination if the seed lab says they're alive? Scarify or stratify before planting? How do you decide what methods to use?
    - Tren (Granite) - stratifications mostly on smaller forb fields. Lots of scarifying methods on small amounts of seeds for grow outs, use USDA recommended processes, usually for plug establishment for going into the field.
    - Perin (Borderlands)- also usually for plug production - they have a propagation database from their nursery work. General rules developed based on seed physiology etc.
    - RNGR is another good resource, has a lot of Borderlands protocols
- Are any of the producers doing microbial inoculation of seeds at planting and then testing the plants to verify inoculation? Are you recommending this to restoration buyers?
    - Tren (Granite) - not on their farms, but they recommend mycorrhizae additions for depleted soils on some projects.
- Do any of the growers offer seed coating? If so, what type (film coating, pelleting, encrusting). Any thoughts or experience with seed coating in arid land restoration projects?
    - Perin (Borderlands)- we pelletize (mix seed with clay/manure and water to bind it, cheap and low tech to help with arid systems having predation/precipitation issues), for

specific grants or contracts that are revegetation for erosion control, the biggest batch they did was 4-5000 lbs of pellets (300 lbs of seeds) - resources are U of A Gornish Lab website, Queen of Seed Balls
        - Laura Shriver - Matt Madsen at BYU has also done a lot of work with seed coats, including hybrophobic coats to delay germination
        - Jeremy P - Cuauhtemoc Villa in California is doing great work with bokashi seeds balls and biochar seeds coating
    - Brett (Bamert)- clay based coatings - takes 6-8 weeks so often too long a timeline for most customers
- In what ways could customers include you earlier in their projects and how would it benefit your farm?
    - Sydney (Curtis and Curtis) - weed issues mentioned earlier, especially for large-scale projects requiring a certain acreage and certain weeds excluded.
    - Tren (Granite)- depends on project scale and species - grasses would have 2-3 years ideally, forbs need longer for any quantity (if you can even establish or produce it) - so ultimately the earlier the better
    - Walter (Southwest Seed) - some species we feel we're better with, it's an advantage to know what the options are in advance so they can add confidence. SW Seeds is good with warm season grasses, some cool season grasses, and forbs whose seeds that don't have a parachute.
    - Robby (Southwest Seed)- the 2-3 years is realistic, but conversations about a specific grow out takes 2 months before paperwork is finished, a lot of things need to be planted in a certain time of year too
    - Brett (Bamert)- we look at inventory and market demand for species and choose which production fields and species we'll do, it's a difficult decision so the earlier we know about the remediation projects the better
- Are any of the producers looking at improving soil conditions to the point where the soil is no longer what the weeds like and they die back? Lots of weeds being non mycorrhizal, increasing soil fungal populations and lowering the pH through regenerative soil practices? Coming from a regenerative soil background. I wonder how that can help reduce the needs for herbicides.
    - Tren (Granite) - we've done some rotations of mustards to help clean up the soil - tilling them in helps with weed control.
- What is REALLY tough to grow and why?
    - Tren (Granite)- forbs in general; some asters are trickier too. Generally any forb is nitpicky, even a good field establishment can have no pollinators, harvesting is also difficult.
- What would growers need from buyers to produce more forbs for the market? Ever had to sit on forb inventory and what prevented it from being sold?

- Brett (Bamert)- yes we've sat on inventory, a lack of demand for that specific species, so sometimes there's been plenty of species for years and it doesn't get used up.
- Walter (Southwest Seed)- when you specialize (they were growing Sego Lily - takes 7 years to get a bulb so it goes for $120/lb - the buyer wants that plant and not that price)
- Brett (Bamert)- sometimes the price drops insanely and you still can't give it away, demand can be an issue regardless of price

- For smaller-scale growers - what equipment and support would reduce the entry barriers, costs, and labor for smaller scale farms?
  - Perin (Borderlands)- a tractor, we've been hand planting so far; and a flail-vac implement for harvesting
  - Justin (Fieldhouse Farm) - I've borrowed everything I can which is not a sustainable practice, hand-picking is stressful but costs of harvest equipment is hard on small-scale. Different attachments for tractors and mechanized equipment
  - Robby (Southwest seed) - an earlier question was about someone new getting into this - every species is so different, farmers are often familiar with grains or something else, a new grower needs to go slow and figure out what each species needs, but equipment is often specific to the plant type. Go slow, ask lots of questions
- How do you determine the cost of seed?
  - Brett (Bamert) - how large is the production field and what is the demand, biggest factor is yield - how many lbs per acre will be produced? Cost of the production field isn't the biggest expense - it's the management, seed cleaning, and combines that is the most expensive. So a product doing only 50-100 lbs/acre has to be 10x the cost of a species that is 500 lbs/acre. How much seed did you start with is also a factor.
  - Tren (Granite) - we track everything that goes into a field (hours, cost, etc.) and we extrapolate from that but it mostly comes down to yield at the end of the day. Grasses are more attractive than forbs by this metric, and they also take more labor.
- Are any of the producers interested in implementing regenerative soil practices to try and increase soil health?
  - Justin (Fieldhouse farms)- wanted native soil to represent the soil that these species would thrive in, but I started off with depleted invaded farmland. Hoped for the best with his fields, wants to do some research into what would work - tilling and cover crops etc. He used native soil in plugs but stopped quickly because the weeds were so prolific. Gains in one area (mycorrhizal starts in native soil) weighed by losses (weeds would not have been hidden in sterile soil).
  - Brett (Bamert) - regenerative soil practices is a broad term, we use some (cover crops, cattle grazing) but aren't 100% focused on it though we improve every year with new practices.