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This report highlights the major activities at the Tucson Plant Materials Center (PMC) during fiscal year 2011. For more detailed information, contact the PMC or the state Plant Materials Specialist at 520-292-2999 ext. 102.

Studies

Technology Development

Desert Zinnia Herbicide Trial

Desert zinnia (*Zinnia acerosa*) is a common, small, and shrub-like perennial forb. It is from the family Asteraceae and is native to Arizona, New Mexico, and Texas. Batamote germplasm desert zinnia was released by the Tucson PMC in 2008. A study was initiated this year to determine the tolerance of desert zinnia to Milestone™ (aminopyralid) herbicide.

Milestone™ herbicide is labeled for the control of susceptible broadleaf weeds. This includes invasive and noxious weeds in rangeland, permanent grass pastures, and wildland sites. Previous studies have shown various degrees of tolerance in native forbs to Milestone™ herbicide, particularly in the Asteraceae family. Three rates of Milestone™ herbicide were applied during July. Post application evaluation indicated susceptibility of desert zinnia to the three rates applied, as compared to the control. A second evaluation will be conducted during the 2012 growing season to determine if the zinnia plants recover from the herbicide damage.



Figure 1: Desert zinnia prior to herbicide application.



Figure 2: Desert zinnia four weeks after herbicide application.

Transitioning to Organic Production

After winning the battle against an array of weeds in 2010, the alfalfa study is now in its first year of forage production. Organic alfalfa is in high demand by the organic livestock industry. Alfalfa can also serve as a critical transitional and soil building crop for conventional growers who want to transition to an organic production system. Alfalfa is an excellent crop to improve soil quality and acts as a good pollinator crop for many pollinator insects. This alfalfa study has two objectives:

- 1) To gather information to assist alfalfa growers who would like to switch from conventionally grown alfalfa to organically grown alfalfa.
- 2) To gather information about growing alfalfa as a transitional crop when moving to an organic cropping system (alfalfa is one of the best options for making a three year transition to a certified organic production).

Two 0.8 acre plots were established at the PMC in 2010 to support the Plant Materials Program National Action Plan Transitioning to Organic Production. One plot was grown using conventional practices and the second was grown using organic practices. During 2010 the greatest challenge was weed control, especially for the organically grown plot because we could not apply herbicides.



Figure 3: Grass weeds in the organically grown alfalfa, 2010.



Figure 4: The stand of organically grown alfalfa in 2011.

Most of the weed control was accomplished by mowing. Once both alfalfa stands grew dense and tall, the underlying canopy and soil was shaded. This limited weed seed germination and growth. To accomplish our objectives, data and observations are being recorded from both plots. We are comparing forage production for both plots as well as evaluating the use of EM-1® Effective Microorganisms® microbial inoculant on the organically grown alfalfa plot. EM-1® microbial inoculant is applied through the irrigation water at the rate of 10 gallons/64,000 gallons of water. This year the PMC completed five cuttings from both plots during the growing season. However, 10-12 cuttings can be accomplished in a year under irrigation in southern Arizona. Calculated forage yields for this initial year of production are averaging approximately 1.6 tons/acre (100% dry matter) per cutting from both plots.

Increasing Native Seed Availability

In April 2011 a five acre field of Moapa Alkali muhly (*Muhlenbergia asperifolia*) was established on a farm near Laughlin, Nevada. The planting is part of a collaborative agreement between the PMC and the Bureau of Land Management (BLM). It was developed to address the need for locally adapted native plant materials for rehabilitation and restoration projects for the BLM Southern Nevada District. Limited seed availability, coupled with the need for large quantities, has forced the BLM to rely on non-native species, cultivar varieties, seed from outside of the Mojave Desert, or do nothing at all for restoration projects.

Five PMC personnel and staff from the Las Vegas BLM, Las Vegas High Desert Resource Conservation and Development (RC&D), and the NRCS Kingman Field Office were on hand to plant approximately 35,000 alkali muhly plants, which were grown by the PMC for this project. The expected result of this grow-out will be native grass seed and native grass straw bales that will be used on BLM restoration projects. The fields may also be used as demonstration plots to recruit new growers to expand native plant materials availability.



Figure 5: The Harter Farms planting team.



Figure 6: Harter farms alkali muhly field in April 2011.

Sells Demonstration Garden

In late May, PMC staff traveled to Sells, Arizona on the Tohono O'odham Indian Reservation to plant six native grass species, (*Bouteloua curtipendula*, *Pappophorum vaginatum*, *Eragrostis intermedia*, *Digitaria californica*, *Sporobolus contractus*, and *Bothriochloa barbinodis*) and one native forb (*Baileya multiradiata*) as part of a demonstration garden. The planting date coincided with a mini-workshop on backyard garden irrigation systems hosted by the Farm and Food Group. Workshop participants planted the native grasses and forb and laid the drip irrigation line to water the garden. The garden area was originally fenced and installed in 1997 with 18 native species. Over the years, most of the native grass species initially planted had died out. The garden is frequently used by the Tohono O'odham Nation Soil and Water Conservation District during their annual Range Day celebration to illustrate what native plants can be found on the range in Sells. With the re-establishment of the native grasses, the plant identification skills of Range Day participants will be enhanced.



Figure 7: Class participants gather for the presentation on irrigation



Figure 8: Class participants planting desert marigold.

Cover Crop Plantings



Figure 9: A field of winter peas in Pima County.

Cover crops include grasses, legumes, and forbs that are planted for use as seasonal cover and to address ten conservation purposes. Some of the major conservation purposes include: reducing soil erosion, increasing soil organic matter, weed suppression, and recycling nutrients in the soil profile. Cover crops are not new to Arizona but have generally been limited to small grains. Over the last four years several trials have been planted in southeastern Arizona with the primary objective of evaluating the performance of legume and broadleaf cover crop species. Information from these trials (seeding dates, seeding rates, and species performance by location) has been incorporated into Arizona's current cover crop conservation practice standard and specification.

As a result of these trials, the NRCS entered into a long term evaluation of cover crops (2011) with the University of Arizona and producers in Pima, Graham, and Cochise counties. These trials include six cover crop species (oats, triticale, peas, vetch, turnips, and kale), three irrigation systems (furrow, center pivot, and drip), and their relationship to yield on succeeding cash crops, such as cotton.

First year results are not finalized. However, we have recorded somewhat mixed results. Cover crop stands and their performance were variable based on location. Additionally, cotton yields have shown variability according to the cover crop species used at each of the locations. One specific comment from the Pima county trial was that seedling cotton

plants were consistently two inches taller in the legume plots versus the non-legume plots. These trials will continue in 2012 with more detailed results to be reported in the 2012 Progress Report.



Figure 10: Root nodules on hairy vetch in Pima County.



Figure 11: Turnips grown in Pima County.

Pre-Release Activities

Big Galleta Population Development



In an effort to fill the need for a commercially available release of big galleta grass (*Pleuraphis rigida*), the Tucson PMC is working with the BLM in Southern Nevada to develop a release for the Mojave Desert. Big galleta is a native, warm-season perennial bunchgrass. It grows to a height between 15 and 35 inches. Big galleta is in high demand for ecosystem restoration and enhancement.

Ten populations collected in Southern Nevada, either by seed or rhizomes, are being propagated at the PMC. The majority of the populations were collected from rhizomes because it has been difficult to collect seed in the past three years in the Mojave Desert. The big galleta plants will be transplanted to a crossing block in the spring of 2012. A genetic analysis to determine variation within and between populations of big galleta will be conducted by the USDA- Agricultural Research Service, Forage and Range Research laboratory, located in Logan, Utah. We anticipate having a release product by 2015.

Figure 12: Big galleta seed head.



Figure 13: Plugs of big galleta in the greenhouse.



Figure 14: Big galleta rhizomes.

Technology Transfer

Technical Documents

Wildfires were a common occurrence throughout the service area this summer. The Horseshoe 2, Monument, Wallow, and Murphy Complex fires burned more than 850,000 acres in Arizona alone. Tucson PMC personnel assisted in developing hand-outs for homeowners listing potential species for revegetation and possible seed vendors. The handouts can be found on the Arizona NRCS and Plant Materials Program Web sites. In addition, the technical note, "Arizona Wildfire Risk Reduction and Recovery Tips for Homeowners" was published to assist those individuals who may have had the task of recovery after a fire.



Figure 15: The Tucson PMC continues to work out of the original adobe buildings built in the 1930s.

Tours, Presentations, and Trainings

A total of 15 tours and presentations were given by Tucson PMC staff over the year. Some tour participants included staff from the Tamarisk Coalition, Cienega High School students, Pima County Master Gardener's, and Cow Lick Farm interns. Additionally, PMC staff traveled to locations such as Winkelman and Prescott, Arizona to present at local meetings on topics such as reading seed labels and field plantings.



Figure 16: Tamarisk Coalition Conference participants

The Tucson PMC: Who We Are

In 1934, the first USDA Plant Materials Center was established in Tucson, Arizona. The Tucson Plant Materials Center was created to address the need for adapted plant material to revegetate eroded rangelands in the southwest. Today, erosion continues to threaten western rangelands in addition to other resource concerns including: drought, fire, invasive species, and wildland-urban interface issues. As one of 27 Plant Materials Centers across the United States, the Tucson PMC continues to address these conservation issues within its service area, which encompasses areas within the Sonoran, Mojave, and Chihuahuan Desert regions.

...And What We Do

The goal of the Tucson PMC is to provide effective economical vegetative solutions for conservation problems. The conservation potential of native grasses, shrubs, forbs, and trees is evaluated at the federally owned 45-acre farm, as well as test locations throughout the service area. Plant materials become part of advanced trials designed to develop cultural and management practices that enhance seed production under agronomic conditions. The ease of establishment and persistence of plant materials in their native plant communities is also evaluated. The PMC conducts studies and plantings to address resource issues in the following areas:

- Rangelands
- Mined lands
- Urban and urban-interface areas
- Croplands
- Riparian areas

The PMC works in partnership with the Natural Resources Conservation Service (NRCS) field offices, resource conservation and development groups, conservation districts, federal and state agencies, non-profit groups and private landowners. Cooperation with agencies other than the NRCS provides opportunities for the joint development of plant materials and management practices as well as for exchange of information, seed, and planting stock.

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