



Mountain State University

ANNUAL PROGRESS REPORT Specific Cooperative Agreement Number 58-1932-2-229 15 July 2005 – 14 July 2006

Summary

Problem 1: Numerous medicinal plant species that have significant economic value are native to West Virginia. Many of these species have been harvested excessively throughout the Appalachian region, and their sustainability, in the face of market demands, depends upon their cultivation. While wild crafting certain plants is a long-standing tradition in West Virginia, agricultural production of valuable medicinal plants is limited because of farmers' lack of knowledge of propagation and processing procedures and their minimal experience with small business creation. West Virginia farmers need to learn how to produce medicinal plants profitably, how to add value to the products by processing them, and how to organize themselves to capitalize on market opportunities. New, high-value medicinal crops that utilize the unique climatic and production attributes of Appalachia would promote agricultural diversification and enhance the economic status of the small farms that dominate the region.

Problem 2: The gastrointestinal parasite *Haemonchus contortus* (barber pole worm) is the most common and serious health problem encountered by meat goat producers in the U.S. This nematode attaches to the abomasal (true stomach) wall where it feeds on the blood of the host ruminant. Diminished animal performance and death caused by *H. contortus* decrease the profitability of goat production. There are only a few anthelmintic drugs labeled for goats, and *H. contortus* is becoming resistant to these drugs. Herbal anthelmintics may help to extend the time during which anthelmintic drugs will be effective. Traditional medicine recognizes the anthelmintic properties of several plant species, some of which may also have high nutritional values and forage/feed qualities and be quite effective for not only reducing parasite infestations but also increasing the health, growth, and meat quality of the animals. For example, purslane (*Portulaca oleracea* L.), an anthelmintic plant for humans, has recently been shown to be highly nutritious, with excellent amounts of omega-3 fatty acids and vitamins A, C, and E. The development of purslane as a forage or feed supplement would be advantageous for meat goat producers in the U.S., as it may enhance meat quality, flavor, and shelf life and help control internal parasites.

Objectives: Mountain State University (MSU) and the Appalachian Farming Systems Research Center (AFSRC) have been working cooperatively on activities related to medicinal plant production, processing and utilization since July 2003. The overall objectives are to identify non-traditional plant species that can be used as forage or feed supplements for finishing meat goats, to control gastrointestinal parasites in small ruminants, or to produce meat with nutritional and health benefits for humans; to develop propagation and cultivation techniques and marketing strategies for Appalachian medicinal plants; and to transfer technologies to students, growers, and entrepreneurs.

Approach: The AFSRC conducts research to identify plant materials having medicinal value for ruminant livestock. Investigations specifically address production and use of herbals for control of gastrointestinal parasites and immune system support. Together with the MSU Medicinal Botanicals Program staff, they are defining relationships between plant growth conditions and the chemical composition of medicinal plants. MSU is leading education, processing, marketing, and technology transfer activities. Academic training will be provided through herbal science courses leading to an associate degree. Creation of linkages within the university supports integration of medicinal plant topics in the Health Sciences and Culinary Arts curricula. Market research is conducted by student interns working under the direction of faculty in the College of Business. Community- and farmer-education efforts involve development of greenhouse exhibits, a demonstration garden, walking trails, and woodland plots supported by plant rescues from areas targeted for construction, mining, and timbering activities. Outreach activities include publication of a newsletter and conference proceedings, maintenance of a dynamic Program web site, and organization of symposia, seminars, workshops, and field days for partners, customers, and stakeholders.

Most significant accomplishment since July 15, 2005

Research: Personnel of the MSU Medicinal Botanicals Program and the AFSRC agreed to redirect the focus of the Medicinal Botanicals Program from education to research in support of CRIS 1932-63000-001-00D, the objective of which is to design forage-based finishing systems capable of producing 80-pound meat goats with carcasses having a high lean-to-fat ratio and meat with consumer benefits. To this end, a research project plan was developed and initiated to identify and investigate plant materials that have potential value in meeting meat goat health and performance, carcass, and meat quality objectives. Greenhouse, field, and laboratory studies involving purslane are being conducted in cooperation with AFSRC scientists and personnel at the NRCS Plant Materials Center at Alderson, WV. Accessions having a desirable growth habit and chemical composition are being selected for use in breeding efforts to maximize the expression of these characteristics and for evaluation in agronomic studies. The anthelmintic potential of purslane is being assessed by AFSRC personnel. Other investigations are focusing on propagation, cultivation, and utilization of native herbs, including cup plant (*Silphium perfoliatum* L.), and groundnut (*Apios americana* L.). This project allows MSU and ARS to join forces to conduct research and outreach activities that help promote growth of agricultural enterprise and expand education and economic opportunities in the Appalachian Region. This project is aligned with NP 207 and NP 205.

Other significant accomplishments since July 15, 2005

Ginseng Cultivation Handbook: In collaboration with a local farmer, Program personnel wrote, published, and marketed a manual on ginseng (*Panax quinquefolium* L.) cultivation and conservation practices. The manual details tips for success that are not available in other publications.

Ginseng Research: With a local ginseng grower, Program personnel initiated an experiment to measure the response of ginseng to different rates of organic fertilizers.

Fourth Medicinal and Aromatic Plants Symposium: The MSU Medicinal Botanical Program and the AFSRC conducted their fourth Medicinal and Aromatic Plants Symposium in Beckley, WV, on

September 16-17, 2005. The theme was “Producing, Using and Marketing Herbs and Non-Timber Forest Products”. The symposium was divided into four sessions, each of them comprised of three or four lectures: 1) Herb Utilization (lectures: The history and chemistry of taxol, a major anticancer drug from *Taxus brevifolia*; Appalachian medicine chest: herbal remedies from your backyard; Effectiveness of selected medicinal plants from India; Herbs for anxiety, stress and depression), 2) Non-Timber Forest Products part I (lectures: The living soil: soil ecology as a foundation for agriculture; Native woods-grown medicinal plants; Production of edible mushrooms; Native orchids: propagation medicinal uses, market potential), 3) Marketing (lectures: Developing a small business; How to read and understand financial statements; Developing markets), and 4) Non-Timber Forest Products part II (lectures: Diversity in indigenous and cultivated populations of goldenseal; Ginseng cultivation and conservation practices; Problems with raising ginseng and poaching; The new West Virginia ginseng law and its regulations). The symposium also included a native plants nursery tour, workshops on plant propagation and herb preparation, a walk through the MSU medicinal plants garden, a tasting of teas from around the world, and a trade show. Dr. James Chamberlain, USDA Forest Service, Blacksburg, VA gave the keynote address titled “Conserving the Appalachian Medicinal Plant Industry”. A local TV station (WOAY Channel 4), interviewed MSU (Dr. Alan Tillquist, Dr. Mario Morales) and ARS (Dr. Joyce Foster) personnel about the symposium.

Spring Herb Conference: MSU, AFSRC, and the West Virginia Herb Association (WVHA) jointly organized a Spring Herb Conference with the theme ‘Producing and Marketing Fresh Herbs and Vegetables’. The Conference was held in Beckley, WV, on May 5-6, 2006 and was attended by WVHA members, Master Gardeners, and community members.

Medicinal Plants Workshops: Half-day workshops were conducted monthly from January through May with an average attendance of 30. Topics included anticancer properties of selected herbs, herbal bath and body products, aromatherapy, herbal medicine, and plant identification.

Personnel: Dean Myles, Horticulture Technician, was promoted to the position of Field Coordinator. Jennifer Harrah was employed as a part-time Laboratory Coordinator in May 2006. During this reporting period, the Program was also supported by a part-time Work-Study Student. Staff members have participated in safety training offered at the AFSRC and completed mandatory ARS Information Technology Security training. Dean Myles has received certification as a pesticides applicator.

Facilities: The Program’s greenhouse has been equipped with two additional wall extraction fans, four sodium lights for artificial illumination, and three 4’ x 10’ aluminum benches. The Program is using land at the AFSRC and at the NRCS-Plant Materials Center, Alderson, WV, and greenhouse and laboratory facilities at the AFSRC. Access to scientific literature at the National Agricultural Library has been facilitated by the AFSRC.

Education: The curriculum for a Bachelor of Science degree in Herbal Sciences was developed and approved. Efforts were made to recruit students to start classes in the fall of 2005, but low enrollment of students prompted the administration to place the bachelor degree on hold. Plans are to offer two herbal science courses as electives in the fall of 2006.

Newsletter: Interest in the Program's newsletter, *The Herbal Dispatch*, has increased steadily since its inception in November 2003. Monthly issues are distributed throughout the U.S. and to Canada, India, and Australia.

Major accomplishments over the life of the project

- Medicinal Botanicals Program personnel with AFSRC scientists organized and conducted four symposia on medicinal and aromatic plants. These conferences have promoted the visibility of the Program country-wide, facilitated staff interactions with researchers, producers, and practitioners, and provided opportunities to transfer information to all segments of the medicinal plant industry.
- Program personnel conceived and publish a monthly newsletter, *The Herbal Dispatch*, that is distributed electronically and by U.S. mail to subscribers throughout the country and abroad. The newsletter is a vehicle by which program developments and activities are communicated to stakeholders.
- The Program maintains a comprehensive, dynamic website (<http://www.mountainstate.edu/usda/>) that includes information on all aspects of the Program, from undergraduate education to symposium materials, and a link to the ARS-AFSRC web site. The AFSRC web site has a link to the Program web site.
- Program-sponsored internships enabled an MSU student to conduct collaborative research on goldenseal with AFSRC personnel. Contacts made by the student have increased the visibility of the Medicinal Botanical Program throughout southern West Virginia.
- Native medicinal plants rescued from habitats being destroyed by industrial activities have been transferred to protected areas for education and research use.
- Hands-on workshops on propagation, marketing, and use of medicinal plants have been offered to the public periodically during the course of the project. These workshops have provided a mechanism for technology transfer and networking opportunities for participants.
- Office space, a Program van, greenhouse and field resources, and classroom space have been acquired to support Program activities. Land, greenhouse space, and laboratory facilities shared by the AFSRC enhance collaborative research, education, and outreach endeavors.

Technology Transfer

The Program has continued to promote its services and provide technical assistance in surrounding communities and has established a cooperative relationship with the West Virginia Herb Association (WVHA). The Program's staff has visited WVHA member's farms, greenhouses and processing facilities, and participated in the WVHA's Fall Herb Festival held at Jackson's Mill, WV, on October 22, 2005, where Dr. Mario Morales spoke on "Woods-grown Non-Timber Opportunities" and Dean Myles spoke on "Environmental Issues of Herbal Production". The Program has increased its assistance to small-scale farmers interested in production of woodland botanicals in Raleigh, Greenbrier and Mercer counties. Dr. Morales attended the West Virginia Science Teachers' Association conference at the Glade Springs Resort, Daniels, WV, on November

10-12, 2005 where he spoke on “Appalachian herbs: Their environment and healing powers”. He spoke on ‘The Medicinal Botanicals Program at Mountain State University’ at the Virginia Tech Department of Horticulture Winter (2005-2006) Seminar Series. Dean Myles spoke on non-timber forest products during the West Virginia University Cooperative Extension Spring (2006) Landowners’ Conference in Hinton, WV. Program personnel presented displays and conducted demonstrations related to medicinal plants at the outdoor gardens and in the Special Promotions Tent at the 2005 West Virginia State Fair. Contacts included farmers, gardeners, teachers, and students from West Virginia and surrounding states.

Publications

Carman, D.C., Myles, D. and Morales, M.R. 2005. Ginseng Cultivation and Conservation Practices. Medicinal Botanicals Program, Mountain State University, Beckley, WV

Myles, D. and Foster, J. G. 2006. Diversity in indigenous and cultivated goldenseal populations in southern West Virginia. p. 57-62. In M.R.Morales and J.G. Foster (eds.) *Appalachian Opportunities: Producing, Using, and Marketing Herbs and Non-Timber Forest Products*. Proceedings of the Fourth Appalachian Medicinal Plants Symposium, September 16-17, 2005, Beckley, WV. Mountain State University, Beckley, WV. ARIS Log # 193797

Morales, M.R. and Foster, J.G. 2006. Proceedings. *Appalachian Opportunities: Medicinal and Aromatic Plants; Producing, Using, and Marketing Herbs and Non-Timber Forest Products*. 4th Annual Symposium, Beckley, WV, September 16-17, 2005. Mountain State University, Beckley, WV.

The Herbal Dispatch, Vol. 3, Issue 7, July 2005

The Herbal Dispatch, Vol. 3, Issue 8, August 2005

The Herbal Dispatch, Vol. 3, Issue 9, September 2005

The Herbal Dispatch, Vol. 3, Issue 10, October 2005

The Herbal Dispatch, Vol. 3, Issue 11, November 2005

The Herbal Dispatch, Vol. 3, Issue 12, December 2005

The Herbal Dispatch, Vol. 4, Issue 1, January 2006

The Herbal Dispatch, Vol. 4, Issue 2, February 2006

The Herbal Dispatch, Vol. 4, Issue 3, March 2006

The Herbal Dispatch, Vol. 4, Issue 4, April 2006

The Herbal Dispatch, Vol. 4, Issue 5, May 2006

The Herbal Dispatch, Vol. 4, Issue 6, June 2006

Popular Press Articles about Program Activities:

- 1) Eanes, A. 2005. MSU Medicinal Botanicals Program scores another hit with successful symposium. *Mountain State University Magazine*, winter 2005, Beckley, WV, p14.
- 2) Blankenship, J. 2005. Fascination with medicinal herbs helps man dispel backwoods myths. *The Register-Herald*, (Yearbook 2005), Beckley, WV, Sept. 24-25, p 8.