

UW College of Agriculture and Natural Resources
Global Perspectives Grant Program

Project Report Instructions

1. COVER PAGE

Award Period (e.g. Spring 2012): Summer 2015

Principle Investigator(s) Sadanand Dhekney **Department:** Plant Sciences
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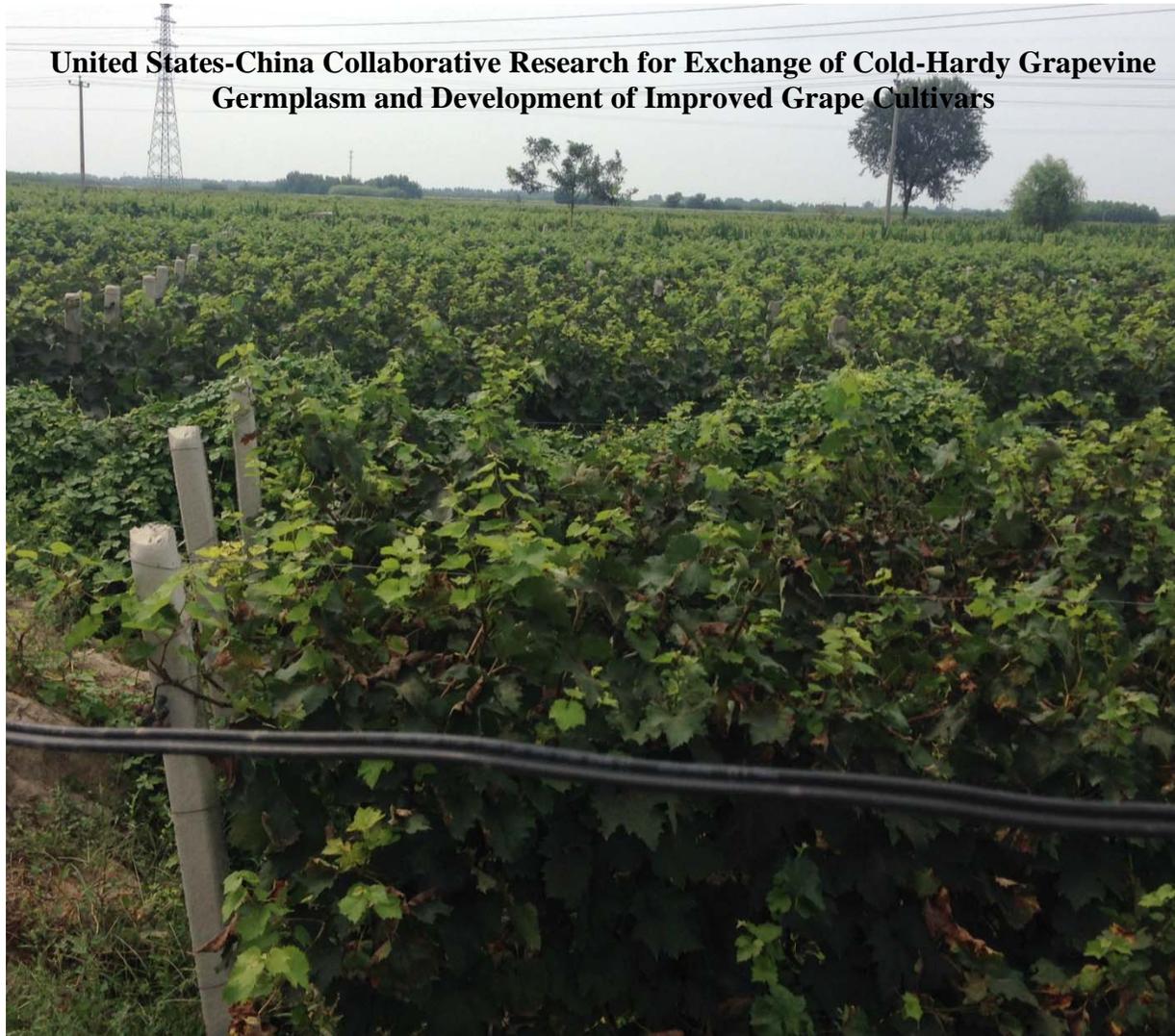
Project Title from Application: United States – United States-China Collaborative Research for Exchange of Cold-Hardy Grapevine Germplasm and Development of Improved Grape Cultivars

Amount spent: \$ 3700

Non-technical summary

The goal of the proposed project is to strengthen collaborative research between the University of Wyoming and Agricultural University of Hebei (AUH), China in areas of grapevine biotechnology and germplasm exchange to enable research, capacity building and education for improving grape production in temperate regions. The objectives are: 1) introduce AUH faculty and students to the UW grape genetics and biotechnology program, 2) visit ongoing grape research at AUH and discuss strategies for sharing *V. amurensis* germplasm and securing funding from international agencies and 3) present opportunities available for higher education and research at UW.

GLOBAL PERSPECTIVE GRANTS REPORT – 2015



University of Wyoming PI: Sadanand Dhekney, Assistant Professor of Horticulture, Department of Plant Sciences, Sheridan Research & Extension Center, 3401 Coffeen Avenue, Sheridan WY
China PI: Dr. Jinhua Chang, Professor Department of Agronomy, Agricultural University of Hebei, Baoding, China.

Travel Dates: August 21 – August 29.

Introduction. The goal of the project was to strengthen the partnership between University of Wyoming and Agricultural University of Hebei to foster international collaboration with UW in research and teaching. PI Sadanand Dhekney traveled to China during the grape production season to meet with faculty, students and grape growers in the region. He also conducted activities to increase global perspectives in teaching and research by introducing existing opportunities for Chinese students and researchers at the University of Wyoming. China is posed to be the largest producer of grapes in the world. The production region is mainly focused in the north east, central and southern regions. Hebei province, which is in the north eastern part of China focusses on the production of cold-hardy grapevine cultivars that can withstand freezing temperatures during the winter season. Grapevine management practices in this region bear striking similarities with those in colder regions of the United States including Wyoming. A majority of the grapevine cultivars planted are *Vitis amurensis* hybrids. ‘Kohoyo’ grape, a Japanese cultivar is predominantly grown (Figure 1) but is being replaced by new cold-hardy grape cultivars being developed by Dr. Chang’s research program. Grape is frequently grown in an intercropping system with agronomic crops such as peanuts, corn and bush beans that provide growers a source of income until vineyards are ready for commercial production (Figure 2; 3; 4). Vineyards are flood irrigated and fertilized using liquid fertilizer combinations. Major problems in grape production are cold damage, susceptibility of cultivars to downy mildew, mainly caused due to increased humidity from flood irrigation and foraging from birds, something that is a big problem in Wyoming too. To overcome these limitations, vineyards are heavily sprayed with agricultural chemicals to manage downy mildew, grape clusters are covered with paper bags following veraison and wide spread netting is employed to control bird damage (Figure 5; 6; 7). Research in Dr. Chang’s laboratory is mainly focused on breeding grapevine cultivars for increased cold-hardiness, larger berry size and resistance to downy mildew.

Travel Itinerary

The PI departed from Sheridan, WY on August 21 and after an overnight layover at San Francisco, reached Beijing, China on August 23. He met with faculty in the department of Agronomy at Agricultural University of Hebei on August 24 to discuss potential research collaborative projects. Possible discussions included writing grants for development of precision breeding of grapevine from improved tolerance to cold and downy mildew. The PI later gave an overview to college students, faculty and staff of biotechnological approaches for improving grapevine tolerance to drought and salinity stress. Dr. Chang provided an overview of the implementation of skills she acquired during her stay at the Sheridan Research and extension center and a tour of the lab and culture facilities (Figure 8). The PI noticed several discrepancies in laboratory procedures and cell culture techniques. The PI conducted a two day training session (August 25 and August 26) on grapevine tissue culture, which involved providing hands on training in culture medium preparation, initiation of grapevine micropropagation and embryogenic cultures and the concepts of clean techniques in plant tissue culture. Such hands on training seemed extremely relevant in view of the high culture contamination rates present in the lab due to conditions of high relative humidity.

The PI travelled on August 27 to visit commercial grape vineyards, meet with growers and get to know first-hand, vineyard management practices and problems encountered during grape production. Grape growers employed management techniques that required intensive labor, but were successful given the easily available manpower in the region. The grapes are grown in loam soil on a vertical shoot positioning trellis system and spur pruning technique. Growers still follow the age-old practice of burying grapevines in the ground to protect from free damage

during the winter season. The PI also took advantage of the region being a major producer of medicinal plants and travelled on August 28 to visit growers cultivating medicinal plants (Figure 9). The region is a major producer of herbs and medicinal plants that are used in Traditional Chinese Medicine (TCM). The PI got information on various herbs being produced commercially and also got the opportunity to visit a pharmacy that was engaged in the manufacturing of traditional Chinese medicine. Finally, the PI also got the opportunity to taste local wine that was produced locally at the grower's vineyard as well as in commercial wineries (Figure 10).

Future prospectives. The UW PI and Chinese PI have initiated collaborative research for sharing information on cold-hardy grapevine germplasm and potential import of wild grape species in the United States for breeding purposes. The Chinese PI plans to send a graduate student and post-doctoral associate in summer 2016 (pending approval from HAU) to be trained in grape cell culture and precision breeding. The grant has provided the impetus to strengthen the collaboration and work towards achieving goals that are of common interest to the Wyoming and Chinese grape and wine industry.

Figure 1. “Kohoyo” grape cultivar that is most commonly grown in Hebei province





Figure 2. Intercropping peanut in a grapevine vineyard



Figure 3. Growing corn as a border crop in a grapevine vineyard



Figure 4. Growing bush beans as a row crop in a grapevine vineyard



Figure 5. A grape vineyard heavily infested with downy mildew



Figure 6. Grape clusters covered with paper bags to avoid bird damage and control downy mildew



Figure 7. Bird netting employed to prevent foraging by birds



Figure 8. Plant tissue culture facility at Agricultural University of Hebei



Figure 9. PI with faculty of the Agronomy department in a medicinal plants field



Figure 10. Wine produced from commercial wineries in China

