



## REDUCING LABOR AND ADVANCING PRECISION AGRICULTURE THROUGH AUTOMATION

ARS advances labor-saving tools and technologies to aid in breeding and production of crops and livestock, improve preharvest and postharvest processing, and enable nondestructive commodity quality assessment and grading. Current agricultural science incorporates crosscutting advances in technology, automation, informatics, and remote sensing to help industry address labor shortages, fine-tune management decisions, conserve resources, and meet growing demands for food. The following advances in FY 2020 highlight this growing focus.

**ARS develops the first automated peanut sampling system.** The USDA Agricultural Marketing Service (AMS) uses a labor-intensive process to assess the quality and value of every load of peanuts a farmer delivers for sale. ARS engineers in Dawson, Georgia, designed and installed instrumentation that reduces the reliance on seasonal labor and improves the consistency and accuracy of the sampling used for determining peanut quality and value. AMS personnel conducted tests for 2 years and have approved the control system for installation for official sampling at commercial peanut facilities.

**Universal intelligent spray control system benefits the environment, saves growers money.** ARS researchers in Wooster, Ohio, developed a universal intelligent spray system as a retrofit unit for conventional orchard sprayers. This new technology can deliver pest and disease control that is as effective as conventional spray systems while reducing pesticide use as much as 85 percent, resulting in an annual chemical cost saving of \$812 per acre. Smart Guided Systems, LLC, commercialized the technology, and citrus, apple, grape, nursery, and pecan growers have started to upgrade their sprayers with this system.



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**Breeding Insight supports ARS specialty crop and animal breeders.** ARS is accelerating and transforming small breeding programs through Breeding Insight ([www.breedinginsight.org](http://www.breedinginsight.org)), which provides breeders with direct access to customized tools, informatics, and database technologies to adopt modern genomics pipelines to their programs. The project is in a pilot phase focused on blueberry, table grape, sweet potato, alfalfa, rainbow trout, and Atlantic salmon, with the future goal of expanding to all ARS specialty crop, animal, and natural resource breeding programs.

**Affordable, portable system for rapid crop assessment and precision management.** Manually collecting data about an organism's physical characteristics (phenotype) is important for breeding better crops but is very time-consuming and requires a lot of labor. An ARS researcher in Maricopa, Arizona, developed a low-cost wireless high-throughput phenotyping system powered by a solar rechargeable battery. This portable system can be mounted to drones for field use or to platforms in greenhouses or vertical farms. This system has the potential to be adapted for use in commercial precision agriculture.