



March 2018

Agricultural Research Partnerships (ARP) Network NOTES

Welcome to ARP Network Quarterly Notes! Our goal is to keep you informed about ARP Network and Agricultural Research Service's current information. We hope that the notes build networking opportunities for businesses to connect with ARP Network Members.

Please help us spread the word by sharing ARP Network Notes with your company contacts, colleagues, other organizations, etc. Thank you!

ARP Network

The ARP Network enlists the help of partners to spark economic development, entrepreneurship and community development. USDA ARS founded the ARP Network to expand the impact of ARS research and provide resources to help companies grow. By combining ARS research expertise with complementary capabilities and talents of partnering organizations, the ARP Network helps stimulate economic growth through technological advancements. The ARP Network matches business needs with ARS innovations and research capabilities and provides business assistant services to help companies and startups solve agricultural problems, develop products and create new jobs. Learn more by visiting us on LinkedIn: <https://www.linkedin.com/in/agricultural-research-partnerships-arp-network-3863a8147>

Save This Date for an Exciting USDA SBIR & ARS Webinar!

Become a USDA SBIR Success Story!

April 11, at 2:00 p.m. ET

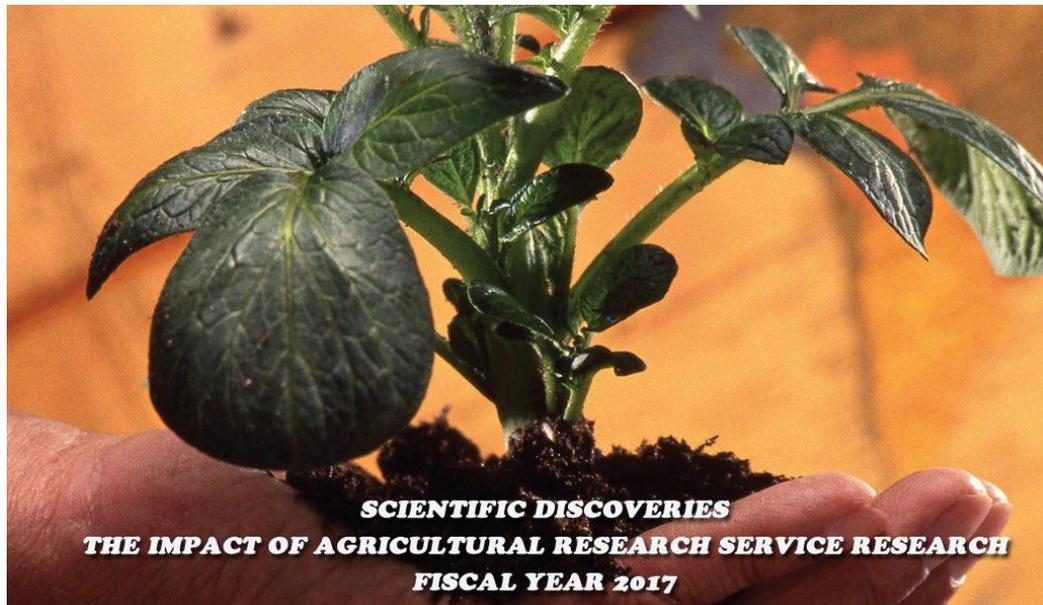
Small companies and entrepreneurs can reap many benefits from technology partnerships with ARS laboratories. Through the National Institute for Food and Agriculture (NIFA), the USDA SBIR program provides competitive grants to small businesses to conduct research of innovative concepts in agriculture.

Please join us for this innovating webinar that will include an overview of the USDA-SBIR program and crafting a competitive SBIR proposal. Also, an overview of ARS research programs and why and how to build a partnership with ARS to enhance your USDA-SBIR proposal. In addition, speakers from two successful SBIR phase I and II awarded companies (PathSensors and US BIOLOGIC) will discuss their experiences with the USDA-SBIR program and collaborating with ARS scientists. **It is free, but registration is required.** Click [here](#) for details.

For more information contact Cathy Cohn: cathleen.cohn@ars.usda.gov

The Impact of ARS Research

Read all about ARS's latest research in the new edition of "Scientific Discoveries: The Impact of Agricultural Research Services – Fiscal Year 2017." Click [here](#) to read.



ARS Partnership and/or Licensing Opportunities

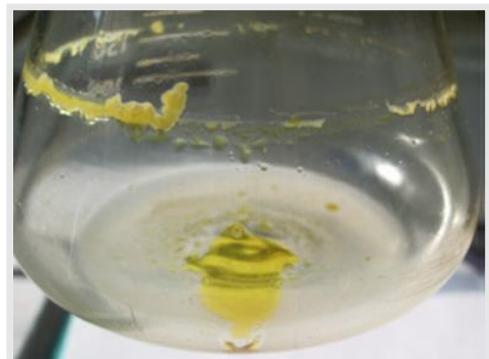
ARS is looking for commercial partners interested in commercializing these technologies and/or evaluating the technologies for potential commercial applications through a Cooperative Research and Development Agreement (CRADA). Many of these technologies are also available for licensing.

Novel Oil Having Antibacterial Activity

Liamocins produced by certain strains of the fungus *Aureobasidium pullulan* have anti-bacterial activity with specificity for *Streptococcus* spp., *Enterococcus* spp., and *Bacillus* spp. The invention includes methods of using the liamocins and compositions containing modified liamocins to kill bacteria. Also included are methods to produce modified liamocins with specific head groups.

Benefits

- Liamocins are chemically different than conventional antibiotics, and cross-resistance should be minimal. They may be effective for *Streptococcus* infections that do not respond to conventional antibiotic therapy
- The liamocins are produced from low-cost agricultural biomass substrates, particularly pretreated wheat straw



Applications

- The liamocins produced could be used as a dairy cattle dip for prevention of mastitis or as a tropical antibacterial treatment
- In more refined forms, the pharmacologically active component(s) of the liamocins have potential to be incorporated into injectable or oral medicines

ARS docket no. 107.13. Please contact Renee Wagner: renee.wagner@ars.usda.gov

Spontaneously Immortalized Avian Cell Line

A spontaneously immortalized avian cell line, designated ZS-1, derived from the primary chicken embryonic fibroblasts.

Benefits

- The immortal cell line is free of avian leukosis virus (ALV) and yet susceptible to all subgroups of ALV, including subgroup E
- Supports virus replication

Applications

- Production of viral agents, e.g., recombinant viral agents, expression of recombinant proteins, diagnostic assays of pathological specimens, etc.

ARS docket no. 87.13. U.S. Patent no. 9,340,815. Please contact Renee Wagner:

renee.wagner@ars.usda.gov

Penicillin Enhancement by Modified Tunicamycins

The penicillins are the most commonly used antibiotics, with >60% utilized in agriculture, but resistance to penicillin is now widespread. The efficacy of penicillins are significantly improved by combining with modified tunicamycins, which are not toxic to eukaryotes. Modified tunicamycins (TunR1 and TunR2) enhance the penicillin efficacy by 32-64 fold, revitalizing penicillin's usage against resistant Gram-positive bacteria.

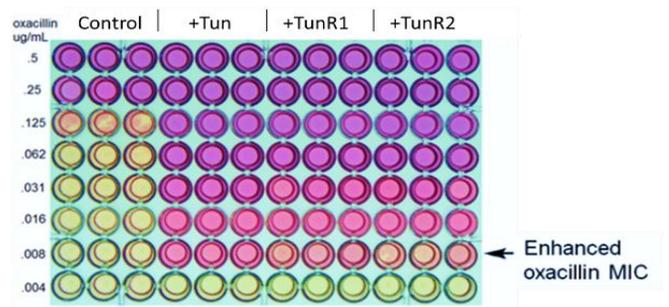
Benefits

- Potent enhancement of medically-important penicillins
- Modifications drastically reduce the toxicity
- The combination of penicillin and modified tunicamycin are more efficacious than either penicillin or modified tunicamycin alone

Applications

- TunR1 and TunR2 are potent penicillin enhancers with new uses in antibiotic formulations for medicine and agriculture

ARS Docket no. 120.16. Please contact Renee Wagner: renee.wagner@ars.usda.gov



Electrospun Casein Fibers and Fibrous Membranes

Methods for forming a fiber mat, involving forming an aqueous solution of proteins, polysaccharides and optionally a plasticizer, and electrospinning the aqueous solution onto a collector to form a mat for potential food applications.

Benefits

- Allows inclusion of micronutrients, heat sensitive bioactives, probiotic/prebiotic blends into functional beverage and food formulations
- The texture and nutritious compositions can be tailored by the inclusion of nutrients during electrospinning or by altering operating conditions

Applications

- New types of foods based on dairy and other food proteins
- Potentially could be used to produce energy dense foods; foods to create satiety to fight obesity through loading of sensitive compounds known to curb hunger; foods for enhanced delivery or time-release of nutrients such as vitamins, antioxidants, minerals, lipids and bioactive peptides; deliver enhanced flavors or textures; tailoring of the bioavailability of foods; foods for medical use; the development of edible sensors; and casein-based non-food materials, such as new fabrics

ARS Docket no. 42.18 + 204.13. Please Contact Jim Poulos: jim.poulos@ars.usda.gov

Attractant Compositions for Weevils of the Genus *Otiorhynchus*

A major problem in combating *Otiorhynchus* weevil attack is monitoring and timing control measures. Because of the night-activity of the adult weevils, growers do not observe the emerging weevils in time to treat with pesticides before the insects begin to lay eggs. Selective attractants would allow monitoring of weevils before the onset of egg-laying. ARS has developed a formulation of attractants consisting of plant volatiles and a weevil trap design effective for attracting weevils.



Benefits

- Monitoring of weevils could help growers identify sites that are at risk for infestation. These nocturnal insects could be trapped, then identified and treated during daylight hours
- For pest management, lure and kill could provide a solution
- Early control of the weevils could reduce the amount of pesticides used

Applications

- The chemicals described may be used alone or in combination to attract different species of *Otiorhynchus* weevils. Any of these chemicals used with the trap design are effective for luring the weevils away from nursery stock and preventing oviposition to control weevil populations

ARS Docket no. 23.17. Please contact David Nicholson: david.nicholson@ars.usda.gov

Isolated Rice LP2 Promoters

The invention is a rice nucleotide promoter sequence that controls light-responsive organ-specific expression of transgenes in plants. The LP2 promoter activates transcription of a reporter gene only within leaves and other green tissues, but not mature seed or roots, of transgenic rice plants. Gene expression is highly responsive to light exposure and is dramatically lower in rice seedlings germinated in the dark. LP2-mediated expression in leaves may also be enhanced by pathogen attack or under drought stress conditions.

Benefits

- The LP2 promoter can be used to control commercial levels of transgene expression in crop plants
- It confers a pattern of light-responsive, organ- and tissue-specific expression

Applications

- This promoter may be a useful tool for genetic engineering improved genetic traits into crop plants (particularly cereal crops like rice, wheat and barley) when the gene of interest needs to be exclusively expressed within leaves or other green tissues and/or in response to biotic or abiotic stresses

ARS Docket no. 150.09. US Patent no. 8,841,434. Please contact David Nicholson:

david.nicholson@ars.usda.gov

Process for Isomerization and Decarboxylation of Unsaturated Organic Compounds with a Metal Catalyst or Catalyst Precursor

Agriculturally-derived fatty acids are directly converted into olefins, or other useful hydrocarbons. The process involves the use of a metal catalyst or catalyst precursor that facilitates the isomerization and/or decarboxylation of unsaturated carboxylic acids derivatives into olefins.

Benefits

- ~100% biobased content helps meet biobased formulation requirements
- Useful as a drop-in for replacement for commercial polymers without modification of existing process

Applications

- Biobased:
 - alkene for polymers such as linear low density
- Polyethylene:
 - polyolefin plasticizer
 - polyolefin lubricant

ARS Docket nos. 26.18 + 10.12. U.S. Patent no. 9,868,679. Please contact Renee Wagner:

renee.wagner@ars.usda.gov

Anti-Corrosion Coating Utilizing Bacterial Precipitated Exopolysaccharides

A method for inhibiting corrosion on corrosion-sensitive metal with a bacterial exopolysaccharide. Specifically, exopolysaccharides precipitated from the ARS Culture Collection (NRRL) bacterial strains coated on low carbon steel alloy provide anti-corrosion coating to corrosion sensitive metals. The corrosion rate for coated metal is less than 0.4 milli-inch per year.



Benefits

- Bacterial exopolysaccharides are bio-based, environmentally benign, and cost comparative to existing anti-corrosion measures
- Exopolysaccharides are produced using readily available commercial fermentation processes

Applications

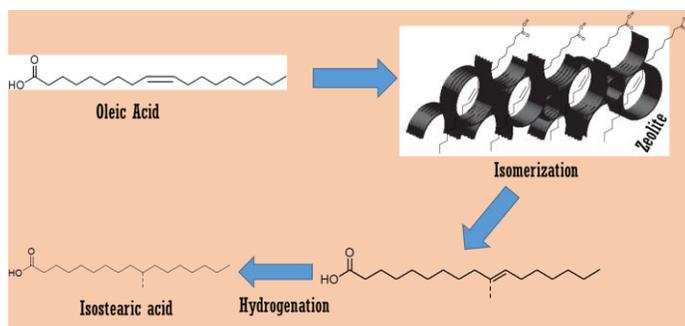
- Preventive measures that will reduce or eliminate corrosion of metals

ARS Docket nos. 16.09. U.S. Patent no. 9,034,436. Please contact Renee Wagner:

renee.wagner@ars.usda.gov

Saturated Branched Chain Fatty Acid Production Method

Three novel catalytic methods of using ammonium cationic zeolites have been developed to produce saturated branched chain fatty acids (isostearic acid) from unsaturated linear chain fatty acid. The three selected zeolites (Ammonium Ferrierite, Ammonium ZSM-5 and Ammonium BETA) are found to produce three different compositions of isostearic acid products which will be



different in physical properties and thus suitable for extended applications. High yield of product has been achieved in combination with specific co-catalysts and optimized reaction conditions even for large scale production.

Benefits

- Property variation in products from different catalytic system is useful to expand the overall application of isostearic acid
- Heat treatment for catalyst will make this technology cost effective and environmentally friendly
- Various zeolite-additives combinations suppress byproduct (dimer) formation effectively and thus produce high yield of isostearic acid

Applications

- Isostearic acid is an important feedstock for producing lubricant, cosmetics, emulsifiers, surfactants, biodiesel, hydraulic fluids and many more products

ARS Docket No. 48.16. Please contact Jim Poulos: jim.poulos@ars.usda.gov

Available Technologies for Licensing

Each year, approximately 60 new patents are issued by the U.S. Patent Office for USDA inventions. The Office of Technology Transfer (OTT) transfers these inventions through licenses to the private sector for commercialization. Here is a link to *recently filed* U.S. patent applications that are available for licensing. This list is updated monthly so check back often! <http://www.ars.usda.gov/Business/Business.htm>

ARS Technology Transfer at a Glance:

<https://www.ars.usda.gov/ARSUserFiles/ott/TT%20at%20a%20Glance.pdf>

Resources for Businesses:

<https://www.ars.usda.gov/ARSUserFiles/ott/Business%20Resources.pdf>

ARS Digital Online Research Magazine

AgResearch is a monthly publication highlighting short features on the scientific research discoveries occurring at all of ARS' research laboratories across the Nation and abroad. View *AgResearch* at: <http://agresearchmag.ars.usda.gov>. One can subscribe to electronic delivery of the magazine on the website.



ARS Food and Nutrition Research Briefs

January 2018 Issue of Food and Nutrition Research Briefs Now Online:

<https://www.ars.usda.gov/oc/fnrb/2018/fnrb0118>

USDA Blog

Check out USDA Blog site for updates on Agricultural issues: <http://blogs.usda.gov>. One can sign up for email updates on the website by checking boxes of categories of interest including the blog, news categories and social media.

ARS

The Agricultural Research Service (ARS) is USDA's primary internal research agency. ARS conducts research to develop and transfer solutions to agricultural problems that are both national and international in scope. ARS has nearly 2,000 scientists nationwide and a few in overseas locations. ARS scientists carry out 690 research projects on a variety of subjects. ARS has a Congressional mandate to disseminate the research findings of these projects to the American public and other interested parties. Learn more by visiting: <http://www.ars.usda.gov>.

Get more information: www.ars.usda.gov

