Inside the full auditorium, King, The Ohio State University’s former interim vice president for agricultural administration and dean of the College of Food, Agricultural, and Environmental Sciences, characterized one of those problems: the overuse of antibiotics and its worldwide impact on humans, animals and the environment.

That problem could not have been more glaring in a U.S. map King referred to that detailed the number of antibiotic prescriptions to outpatients in 2010.

“A reminder,” Lonnie King said as he was about to address an audience of graduate students and faculty. “We don’t do research because we can. We do it to solve critical problems.”

In the Midwest, 87 percent of outpatients received an antibiotic, according to the “New England Journal of Medicine.” The South’s prescription rate was even more alarming: 93 percent.

The frequent issuing of antibiotic prescriptions is fueling antibiotic resistance, which occurs when the infectious organisms that the drugs are designed to kill, instead adapt, making the drugs no longer effective, said King.

“It’s one of the most critical problems we face today in medicine, both in animals and in humans, one that’s getting worse,” he said.

In 2015, King was named vice chair of a council established by the U.S. Department of Health and Human Services and the Department of Defense to devise a national strategy to fight antibiotic-resistant bacteria.

In April 2017, King was one of the keynote speakers at the annual research conference of the Ohio Agricultural Research and Development Center. “Biological Resistance: Opportunities and Challenges for Agriculture and Society” was the theme of the event, held at Ohio State’s Columbus campus.

King advocated for a comprehensive approach to combatting the problem with improved monitoring of how often antibiotic prescriptions are used, the use of antibiotics with animals only when they are sick, and the development of new diagnostic tools that distinguish between viral and bacterial infections.

“We have to look at this as an integrated strategy,” King said. “We can’t just look at resolving this problem in human health by itself or in animals or in environment.”

Story continues on next page →
Without antibiotics, some infections might never be cured. But, King pointed out, if antibiotics are overused or not used correctly, they can contribute to “the microbial storm” that affects the health of humans, animals and the environment.

Every year in the United States, at least 2 million people become infected with bacteria that are resistant to antibiotics; and at least 23,000 people die each year as a direct result of these infections, according to the Centers for Disease Control and Prevention.

The speed of microbial resistance is far outpacing the development of measures that would defeat the infections — not only in people but also in animals, King said.

“There has to be a whole change in the culture of prescribing,” King said.

Besides antibiotics being overprescribed to patients, other factors that contribute to antibiotic resistance include that patients don’t always take antibiotics for the prescribed period of time and that antibiotics, until this year, had been used in animals to spur growth, King pointed out.

Compounding the problem, he said, is a lack of new diagnostic tools to determine whether an infection is viral or bacterial; and if the infection is bacterial, what the best antibiotic is to fight it off.

To help stop antibiotic resistance, Ohio State can play an important role by teaching undergraduates and graduates in health, animal, and environmental sciences fields to understand their responsibilities going forward, working with human and animal health practitioners, and providing guidance to farmers and producers, King said.

“There’s a new sense of urgency. How could there not be?” he asked.

“And we have this array of knowledge and researchers that actually can make a dent in this problem.”

Continued from previous page

Two studies are being done at Ohio State’s College of Food, Agricultural, and Environmental Sciences to determine the best way to deal with the bugs that tend to thrive in hot, dry summers.

Entomology Associate Professor Andy Michel is leading the research into the species of stink bugs that prey on soybeans: the red-shouldered, the green and the brown marmorated stink bug.

Michel is on the second year of a three-year project funded by the Ohio Soybean Council and the North Central Soybean Research Program to determine which species of stink bugs cause the most damage to soybeans and how prevalent the bugs should be before spraying.

Seizing on developing soybean seeds, stink bugs attack the plant using their wide and sharp mouths, which extend to nearly half the length of their bodies.

“They pierce through the pod, go on to the seed, then add enzymes and saliva to suck up the nutrients,” Michel said. “In the end, it looks like a shriveled up, brown, discolored seed.”

OSU Extension Entomologist Celeste Welty is part of a 15-state study to determine the best and, ideally, natural way to get rid of the brown marmorated stink bug, the type that often finds its way inside houses during the winter months.

The study is focused on finding the bug’s natural enemies.

“The stink bug is a terrible pest in agricultural crops,” Welty said. “We want to know how to control it with more sustainable methods than just spraying a lot.”
Wicked weeds to battle in 2017

Ohio’s most wicked weeds have a few things in common: They tend to grow rapidly, are extremely competitive, and can develop resistance to herbicides in only a couple of years. Mark Loux, Ohio State University Extension weed specialist, offers farmers the following strategies in their fight against the yield-sucking plants.

GIANT AND COMMON RAGWEED (A) are nuisances in corn and soybean fields. Not only are the weeds adapted to a range of different environments, but their ability to emerge throughout the growing season makes them hard to manage. These factors, in addition to giant ragweed’s large leaf area, allow the weed to compete with crops for water, nutrients and sunlight throughout the growing season.

According to Loux, the most effective ragweed management programs include the following steps:

- Control weeds that emerge prior to planting with tillage or pre-plant burndown herbicide applications.
- Apply pre-emergent herbicides with activity on giant ragweed to reduce competition with crops, provide flexibility in the timing of post-emergent herbicides, and minimize the need for a second post-emergent application.
- Apply post-emergent herbicides before giant plants are more than 6 to 10 inches tall, and when common plants are less than 6 inches tall.
- Scout fields two weeks after the first post-emergent application. Control escapes, or plants that emerge after the initial post-emergent application, with a second application. Where needed, make the second post-emergent application three to four weeks after the first, before plants regrow to a larger size.

MARESTAIL (B) emerges from late March through June and from late summer into fall. It is most easily controlled during late fall when the plant is in the seedling or young rosette stage, Loux said.

Here are steps for managing marestail, according to Loux:

- Use fall herbicide treatments.
- Apply effective burndown herbicides in the spring.
- Include non-ALS residual herbicides. (ALS herbicides inhibit acetolactate synthase.)

WATERHEMP (C), according to Loux, is found infrequently in Ohio, but it can become resistant to any site-of-action herbicide used repeatedly. When dealing with waterhemp, growers need to figure out to which herbicides the population is already resistant. The University of Illinois weed science group will screen waterhemp for $50 per field. Information is available at bulletin.ipm.illinois.edu/?p=3619.

Loux recommends a residual herbicide at or before planting, and he said it’s important to spray the weed when it is less than 4 inches tall. If necessary, waterhemp can be sprayed a second time when older, but it is important to use an herbicide with a different site-of-action.

Story continues on next page

Photos B, C and D courtesy of u.osu.edu/osuweeds.
PALMER AMARANTH (D) is a fast-growing pigweed that emerges anytime between early May and August. It is extremely aggressive and can outcompete crops on almost every level. To control the spread and growth of Palmer amaranth, Loux recommends these guidelines:

- Follow the University of Tennessee’s recommendations of planting cover crops such as wheat or cereal rye mixed with vetch or crimson clover to help reduce Palmer emergence up to 50 percent.
- Contact the Ohio Department of Agriculture for screening of seed for the presence of noxious weeds prior to planting. Contact the ODA Division of Plant Health’s Grain, Feed, and Seed Section at 614-728-6410. The seed must be picked up by ODA representatives; it cannot be mailed or dropped off.
- To prevent Palmer seed spread, clean out equipment, check for seed in feed products and store manure in pits for a short time to reduce seed viability.
- Post-emergent herbicide application timing is critical and must be applied when the plants are less than 3 inches tall.
- Scout fields in mid-July for plants that have escaped prior herbicide treatments, and then remove them by hand.

Contact OSU Extension’s Agronomic Crops Network at agcrops.osu.edu for help with identification or management advice.

Find additional information about weeds and herbicides for the agricultural community at u.osu.edu/osuweeds.

OSU Extension programming support
Consider making a gift to Ohio State University Extension Work in Ohio, Fund #306726 (go.osu.edu/BxKG). This fund supports OSU Extension programming, which strengthens families and communities, prepares youth for success, enhances agriculture and the environment, and advances employment and income opportunities.

Gwynne’s gains
Look for new players like riprap, blazing star and willow fascines in Ohio State’s Gwynne Conservation Area.

The nearly 70-acre facility, part of CFAES’s Farm Science Review site at the Molly Caren Agricultural Center in London, Ohio, has started two new projects — one to diversify its prairie plantings (by seeding wildflowers like blazing star and others); the other, to protect the banks of local Deer Creek (by using, among other things, soil-grabbing bundles of live willow stems called fascines).

Review Manager Nick Zachrich said the projects offer double benefits. They improve the Gwynne area, and they demonstrate practices that people — including the Review’s 100,000-plus visitors every September — can take home and use on their own land, too.

To learn more, visit go.osu.edu/theGwynne.

New healthy soil program launched
OSU Extension has begun a new signature program called Healthy Soil Healthy Environment (soilhealth.osu.edu) to help increase soil health and awareness of new research.

The website will serve a variety of clientele including traditional, organic, no-till, sustainable and low-input farmers; landowners; 4-H youth; adult and youth urban gardeners; Master Gardener Volunteers; crop consultants; agricultural retailers; salesmen; underserved populations; and the general public.

Even more ways trees are cool
Woodlands — including your own, if you have some — play a complex role in keeping Earth cool. This role goes far beyond absorbing carbon dioxide, so says new research co-led by Kaiguang Zhao of CFAES’s School of Environment and Natural Resources.

Explore the science: go.osu.edu/ForestBenefits.

SPEED READ
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