Consider, for a moment, the dried bean. It is a seed unadorned. It lacks the voluptuousness of a red, ripe tomato. It can’t promise the alluring aroma of a freshly peeled orange. And, in the American diet, it is an afterthought compared with the ubiquitous seeds of cereal grains like wheat, oats, and corn.

That’s a shame because, when you consider its qualities as both a crop and a food, nothing beats a bean.

Dried beans are pulses, or grain legumes—a larger category that includes everything from pinto beans and chickpeas to lentils and split peas. Pulses are nutritional powerhouses packed with fiber, protein, micronutrients, and amino acids. They can lower cholesterol, reduce the risk of heart disease and diabetes, and may help prevent various types of cancer. They are low fat, naturally gluten free, and extremely economic sources of protein—often costing only pennies per ounce.

Pulses are also friendly to farmers. They can fit readily into crop rotation plans, don’t require much water, and naturally fertilize fields by taking nitrogen in from the atmosphere and securing it into the soil—desirable qualities that aren’t exactly breaking news. Archaeological digs have unearthed evidence of pulse cultivation dating back more than 10,000 years. And in November, the Food and Agriculture Organization of the United Nations declared 2016 the “International Year of Pulses” (see sidebar, p. 6)

Hoping to capitalize on the UN’s message, growers associations, agribusinesses, public health officials, and food scientists have sprung into action. Research grants are being written. Ad campaigns aimed at Millennials are in the
works. Pulses are even getting Facebook pages and Twitter accounts.

The magic of the bean, however, is that we may not even have to change our diets to receive their nutritional benefit. Instead of trying to build bigger consumer demand for whole pulses, many people are taking a different tack—transforming pulses from a traditional staple into bold, new ingredients in the foods we already eat.

But before any of these campaigns can truly claim success, there’s one riddle they must unravel—why do Americans eat so few beans?

Beans, Beans, the Forgotten Fruit?

For anyone looking to launch an “eat your pulses” campaign, America would appear to be a good place to start. The U.S. is currently mired in an obesity epidemic and still shaking off lingering hard economic times. Sustained droughts and projected climate change impacts result in news stories about the water demands of the foods we eat. An affordable, sustainable source of protein and fiber would seem to be just what the doctor ordered. Yet pulses are largely absent from the American diet. In other words, when it comes to pulse consumption, there’s nowhere to go but up.

“People in the U.S. are not getting with the plan and taking advantage of the health benefits of pulse crops,” says Henry Thompson, director of the Cancer Prevention Laboratory at Colorado State University. “Americans should probably eat 250 to 300 grams per day, and right now, on average, they’re eating about 10.”

According to the USDA, pulses find their way onto less than 14% of American plates on any given day. And the trend is a downward one. Since the 1960s, our consumption of dry beans of any form has dropped significantly.

“In my estimation, [that] qualifies as a food deficiency,” says Thompson, who has studied the health benefits of pulses for more than a decade.

Thompson thinks that a lot of this has to do with the perception that pulses “are a poor man’s food.” He says that, as cultures become more affluent, they tend to favor protein sources that are higher up the food chain. Over the last few years, Thompson has met with public health officials in Brazil, a big producer of dried beans. Concern there is growing, he says, as “people abandon beans for animal proteins.”

In addition to the health concerns, this move from beans to beef is unsustainable. Increased demand for animal-derived proteins means a corresponding demand for the water and crops needed to grow those animals. The idea that billions of people on earth will be able to get their protein from pork chops and steak isn’t just unsustainable, Thompson says, “it’s ridiculous.”

But Thompson is hopeful that the increased attention to pulses may help turn the tide. “I don’t give up on people,” he says. “I think if we do a better job of explaining this to the general public, who is hungry for new ideas, many more people will make sure that pulse crops are regular components of their diet.”

Planting Pulses in the Public Consciousness

For Joe Cramer, the executive director of the Michigan Bean Commission, the idea that the general public can learn to eat their beans isn’t too far fetched. Pork wasn’t always “the other white meat,” and before we were asked if we “Got Milk?” the nation’s dairy industry had to convince us we needed it in the first place with commercials of boys staring wistfully in mirrors, gulping a glass of milk, and morphing from scrawny to brawny. From beef to eggs to pomegranate juice, national ad campaigns have helped elevate many foods to staples in our diets.

With 900 or so growers, Michigan ranks as the second largest producer of beans in the United States, behind only North Dakota. Ninety percent of those beans end up in cans, and nearly 40% are exported to other countries. Should demand for pulses go up, Cramer says, Michigan farmers would be more than able to help meet it, but that’s a big “if.” National campaigns cost a lot of money, he says, “and we [the bean industry] have never taxed ourselves to the level [needed] to promote the great message that we have.”

Part of the problem is that bean growers are represented by state associations, so there is no national dry edible bean organization to harness the disparate interests of growers of so many different varieties of beans. But, even if there were, Cramer says that there is a ceiling to whole, dry edible beans in American markets. That’s
because many, if not most, U.S. consumers never really ate
them in the first place.

“I think that the road block is kind of the American cul-
ture,” Cramer says. “If you look at your grandparents’ diet
or parents’ diet, we grew up around a meat and potatoes
‘American’ kind of meal. You know, pot roast and meatloaf
and all that kind of stuff.”

That experience is undoubtedly changing, Cramer says.
Younger generations are shopping with local, sustainable
and healthy food in mind. And growing populations of
Americans from Latin American and African countries are
bringing traditional recipes loaded with peas, lentils, and
beans to the national menu. “Even us Midwesterners are
getting out of our ‘roast beef on Sunday box,’ and we enjoy
it,” he says. “I mean we eat sushi nowadays!”

But, for now, beans are nearly as foreign as sushi. Except-
ing, perhaps, pork n’ beans, most Americans simply have
little to no experience preparing pulse crops. “The Brits
drink tea. We drink coffee. That’s just kind of the way it is,”
he says.

“I think the growth potential for our industry isn’t in
a can or a package but is really in the ingredient,” Cra-
mer says. Because bean powder is made using the whole
bean, he says, “It doesn’t lose anything. Whether it’s fiber,
minerals, or vitamins, we always say we’re only one amino
acid away from being a complete, perfect food, and when
you can incorporate that into a muffin mix or pudding …
that’s incredible. There are lots and lots of different ways to
include the benefits of beans that look very different than
what we’re used to.”

Snacking Our Way to Better Health?

The future of the pulse may look very different from its
past, and for ASA, CSSA, and SSSA member Janice Rueda,
that is cause for celebration. Rueda, who holds a Ph.D. in
nutrition and food science, is the business manager of Ar-
cher Daniel Midland’s Edible Bean Specialties, Inc. She has
spent the past several years promoting the health benefits
of dry edible beans as an ingredient, the form, she believes,
that may prove most beneficial to public health.

“We’re taking beans to places
nobody ever thought they would
go,” Rueda says, ticking off a
list of products currently on
store shelves with beans as
an added ingredient—
chips, pastas, puddings,
and power bars. And
these are just the
beginning. While
ADM’s bean
processing
plant in

The United Nations declared 2016 the International
Year of Pulses (IYP). Pulse crops are a critical and
ancient part of the food basket. And, they are foods
you already enjoy! The Crop Science Society of
America (CSSA) is taking a leading role in efforts to
inform the public—and other scientists—about the
importance of pulses to human and soil health.

What Are Pulses? Why Are They Important?

Pulses are beans and peas that are harvested dry:
lentils, chickpeas, pinto beans, kidney beans, etc.
(full list http://bit.ly/1b2vboz). Pulses:

• provide plant-based proteins and amino acids,
  ensuring food security.
• fight obesity due to their high fiber content.
• prevent and help manage chronic diseases such as
diabetes, coronary conditions, and cancer.
• are an important source of plant-based protein
  for livestock.
• fix nitrogen, increasing soil fertility.
• are sustainable, using less water than many
  other protein crops.

CSSA created a website, www.crops.org/IYP,
that contains information for scientists and public.
The site will be updated monthly. Current sections
include:

• Scientists: Journal articles and meetings about
  pulses
• Public: Eating and growing pulses and general
  stories about pulses.
North Dakota has been cooking, dehydrating, and grinding whole beans into their trademarked “VegeFull” flour for the last 16 years, the market for the product has only recently taken off.

“The number of product launches in the last two years using beans as ingredients has doubled,” she says, predicting an even bigger wave of new products in the coming year.

Product developers are jumping on the bean bandwagon, Rueda says, because of a demand from consumers for “clean labels” and an industry trend toward “better for you foods.” Bean ingredients may cost more than those derived from corn or wheat, but they boast a bounty of attributes that are valuable to consumers. Products using bean ingredients are not only cholesterol free, gluten free, and GMO-free, they’re also chock-full of the “better for you” stuff that sells.

“A traditional snack chip provides very little in the way of nutrition, except for calories, sodium, and, usually, fat,” Rueda says. “By tweaking the ingredients to include beans, now in that 1 oz serving of chips, you can get 4 to 6 g of fiber and about 4 g of protein.” For anyone who noticed whole grains creeping into our snack foods over the last few years, the writing is on the wall—beans contain far more fiber and protein than even whole grains. And that means ground navy beans or powdered pintos may soon find their way into your cheese puffs or brownie mix.

Great Taste, More Filling—through Science

As the bean ingredient market takes off, researchers are hoping to help guide its development. The bottom line, says Mike Grusak, current CSSA president and a research plant physiologist at the USDA-ARS Children’s Nutrition Research Center, is that “we want this stuff to taste good. There are so many new products being developed by manufacturers and discarded by manufacturers if they don’t sell. And, you know, we don’t want to have bean products come out on the market that don’t taste good and consumers say ‘well, I tried a bean product once, and I’m never going to try that again.’”

Grusak helped develop the “Pulse Crop Health Initiative” that was authorized for appropriation in the 2014 farm bill. The idea was to conduct research on the health benefits of pulse crops and the barriers keeping consumers from eating them, but Congress declined to fund it. That sent Grusak back to the drawing board where he and colleagues quickly landed a planning grant from the USDA’s National Institute of Food and Agriculture’s Specialty Crops Research Initiative.

“We are trying to do what we can to get more pulse crops into the diets of consumers,” Grusak says. Manufacturers are already taking advantage of the nutritional value of beans, he says, by putting them into snack foods and other products. “But from our discussions with manufacturers, it became clear that they need more help in how to use these formulations in their products. They’re asking what inclusion percentages make sense. What are the properties of these ingredients, and how do they function in products like pasta or bread?”

While Grusak works on establishing a national effort, some bean-growing states have already begun research to answer these questions. Karen Cichy, a plant geneticist with USDA-ARS, is working in collaboration with Dr. Parry Ng at Michigan State University on a project funded by the Michigan Department of Agriculture. The group is exploring how the properties of different varieties of beans vary in powdered form—from the basics like taste and texture to more in-depth details like protein-holding capacity.

The impetus behind the project, Cichy says, was that “we know there are compositional differences in the varieties [of beans], but we’ve never been able to figure out what that means for making a powder. We know some beans have more starch or
Legume Ingredients Have Long, Ancient Tradition in Many Diets around the World

by Madeline Fisher

Making pastas or cookies with bean powders may be novel to most Americans, but CSSA member Matthew Blair is here to remind us that baking with legume ingredients definitely isn’t new in other parts of the globe.

“The tradition in India, Bangladesh, Nepal, and Pakistan is to make all sorts of breads with a high proportion of legume flour—often mung bean or chickpea flour, sometimes lentil flour,” says the Tennessee State University (TSU) pulse breeder. “So it’s important, now that we’re rediscovering these [ingredients] in the United States, to recognize that they have a long and ancient tradition especially in the vegetarian diets of South Asia, in East Africa, and increasingly around the world.”

Flours made from legumes don’t contain gluten: the gluey protein that gives cereal dough its elasticity and helps it rise during baking. But they outdo cereals in other ways: specifically in their levels of nutrients, fiber, and certain amino acids that are critical to human nutrition.

“They’re very complementary to anything that has good levels of methionine and cysteine,” Blair says. “And they provide high lysine, which most cereals are low in.” To compensate for their inability to rise, legume flours are usually mixed with bread flours to prepare items such as chapatis, pancakes, and pizza dough, as well as focaccia and other flat breads.

Another traditional food hails from West Africa. There, black-eyed pea fritters—or “akara” as the dish is called in Nigeria—are a popular street food and a household staple. To make them, dried black-eyed peas are soaked overnight in lots of water. The peas are then drained, sometimes peeled, finely ground, and mixed with onion and spices, before being shaped into small balls for frying.

The fritters are delicious and very nutritious, Blair says. But if soaking, peeling, and grinding black-eyed peas sounds like too much work, easier options exist for cooking with legume ingredients. One of Blair’s favorites involves replacing about half of an instant cornbread mix, such as Jiffy brand, with chickpea or mung bean flour. The flour—which can be procured at most Asian grocery stores—gives the cornbread a homemade feel, he reports. In fact, Tennessee state lawmakers who tasted it at a recent agriculture day in Nashville declared it “equal to their grandmother’s cornbread,” he says proudly.

That’s significant because Blair is now hoping to ramp up pulse production in Tennessee. The state has one of the country’s largest populations of South Asians outside of California, for one. Plus, it’s a huge canning state, home to the Bush Brothers canning company.

Most importantly, prior to World War II, the South was the country’s biggest producer of black-eyed pea (also known as “cowpea”), and the crop is well adapted to the region’s heat. Today, California is the nation’s top producer of black-eyed peas. But production there relies on irrigation water that is growing increasingly scarce, says Blair, who now heads a TSU cowpea breeding program with 800 genotypes at its disposal. “So,” he asserts, “the future of cowpea, mung bean, and nearly all the heat-tolerant pulses is in the Southeast.”
proteins or metals or flavors, but how do we actually choose what’s the best ingredient?"

Cichy points to a recent experiment comparing black beans with navy beans. While it was no surprise to see a dramatic black and white color difference, since the whole bean is used to make the powder, the flavor profiles also diverged. “The navy bean had a much more subtle flavor, whereas the black bean was much more intense,” she says. Her recent data also points to marked differences in the starch composition of different bean varietals, which could influence the texture of any final product. Using beans as an ingredient, Cichy says, is still a relatively new process. She hopes her work can help manufacturers palatably harness the power of the pulse.

In addition to facilitating basic research like Cichy’s, Grusak also hopes to foster collaborations that help advance work on the supplier’s end. For example, once scientists isolate specific traits in bean varieties that have value for food manufacturers, like increased nutritional value or consistent taste, breeders “could select for those traits just like they breed for yield or color or seed size,” he says.

It’s a food systems approach—helping farmers grow a better bean, building a better ingredient for food manufacturers, and creating the best possible experience for consumers.

Can We Have Our Snacks and Eat Beans, Too?

As much as the American public would be well served to find new recipes, learn to cook them, and incorporate more whole foods into their diet, only a subset of the population is ever going to have that motivation. According to market research, says Rueda, health concerns are rarely the “primary driver” behind our purchases. In most cases, taste, price, and convenience are qualities that lead a shopper to toss something into their cart. While they’re well aware they should eat more vegetables and less sugar, that awareness doesn’t always lead to changes in eating habits.

“People are going to snack, period,” Rueda says. “And people don’t get enough fiber, period. So the idea is, instead of saying, ‘Don’t snack,’ it’s saying, ‘Hey, we have an opportunity to make the snacks healthy and taste good.’”

Of course, it somehow seems like cheating if we can change what we eat without having to change how we eat. Can we really snack our way to better health? Henry Thompson, for one, would prefer that the public eat more whole foods. He also thinks that the USDA could help immensely if it clarified the pulse’s standing in dietary guidelines and gave them their own category. “We need to move toward setting specific recommendations for their consumption and not simply call them ‘vegetables’ or ‘legumes.’ We need to get specific and tell people, ‘This is what you need to do.’”

But, Thompson says, he recognizes that people who search out beans because they’re low in fat and full of fiber and protein are likely already making decent dietary choices. Despite his passion, he acknowledges there are segments of the population who aren’t going to soak, rinse, and cook up a pot of pulses anytime soon. “But they will respond by eating them as convenience foods or snack foods,” he says. And that’s a battle he’s willing to concede. The power of the pulse endures, whether it’s whole or powdered.

“I’m willing to lose a little to gain a lot,” Thompson says. If we can boost pulse consumption and improve nutrition through snacking, then he’ll still consider it a victory. The most important thing is just that we get beans back on the menu, whether it’s in a homemade chili or a bag of chips. “Pulses have basically disappeared from the American plate,” he says, “and this is the time for the rediscovery.”

A. Hinterthuer, contributing writer for CSA News magazine

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