Still Growing Strong

Biointensive method continues to help farmers reap ultra-productive harvests, boost soil health

John Jeavons is known around the world as the leading exponent of the small-scale, sustainable agricultural method he has trademarked as Grow Biointensive. Working from the heart of Mendocino County, California, he is a tireless advocate, developer and researcher of intensive growing. Over the years he has proven that the title of his best-known book, How to Grow More Vegetables, Fruits, Nuts, Berries, Grains, and Other Crops Than You Ever Thought Possible On Less Land Than You Can Imagine, *is no exaggeration. As he tells below, Jeavons has been hard at it for over 40 years, yet he still talks about his work with unabashed enthusiasm and passion.*

— Chris Walters

John Jeavons

ACRES U.S.A. Were you always interested in food and growing things? Did that always appeal to you?

JOHN JEAVONS. Yes, at age 2 I was at my aunt and uncle's dairy farm in Pennsylvania in Amish country. They had a kitchen garden and a grape arbor, and I was just fascinated. I loved it. That was just for a brief visit but years later I moved with my family to Arizona. We lived in a suburban home that had been built in a former grapefruit orchard, and of course all the homes had grapefruit trees. There was a big grapefruit orchard nearby, and I enjoyed that. I enjoyed gardening even though the heat was sometimes extreme. We had one tree in our backyard that had chickens and ducks around it — though I really didn't make the connection until very recently, that tree produced at least four times the grapefruit and was about four times the size of the other trees. It was all due to the chicken and duck manure that made it so much healthier. But I have always enjoyed plants and gardening.

ACRES U.S.A. When did you settle in California?

JEAVONS. In the late '60s I was interested in going into farming. I traveled to the San Joaquin Valley in central California, which at the time was producing 30 percent of the food for the United States, and I talked to farmers and agronomists. I asked them what the smallest area where you can grow all your food in an environmentally sound and equitable way. They said they really didn't know, but if you had 1,000 acres of wheat and if it was a good year you would be able to pay your bills. I learned several things from this experience. One was that farming wasn't being cost-effective if it had to be a good year for you to break even. Not immediately but soon thereafter 100,000 farms went bankrupt every year for a 10-year period in the United States. The second thing I learned was that if I wanted to know the answer to my question, it was tag — I was it! I'd have to find out the answer for myself. I had my work cut out for me.

ACRES U.S.A. Did your university training play a role in forming your approach to intensive growing?

JEAVONS. I went to Yale University. My major was in political science and I was particularly interested in political philosophy. From a functional point of view you could see that in the Middle Ages certain political institutions provided one function, and by the 1970s other institutions in society produced the same function. I was interested in this sort of multifaceted parallelism. I loved geography and even spent an extra semester in school in order to take all the geography courses I wanted. Then I worked for USAID after I graduated on a special information-gathering project.

ACRES U.S.A. What was USAID?

JEAVONS. That's the U.S. Agency for International Development. It's the organization that gives skills and funds for improving life in other countries. After I decided to move back to California and there I worked for Kaiser Aerospace & Electronics as an administrative engineer. During summers in college I had worked at Motorola Aerospace Electronics doing time and motion studies. I figured out ways to make paperwork easier to fill out so that tests of parts coming in to Motorola could be reported more easily and in a flow that was more fun for the testers and inspectors. I also learned about sample testing there, that you can sometimes have more accurate testing by testing part of a group of parts than by testing all of them. That's been instrumental in some of the ways I've been able to acquire information about farming. After Kaiser Aerospace & Electronics, I went to the Stanford University library system where I was Chief of Business Services. It was and is a very large library system with over 500 staff and something like 23 libraries. I was in charge of things such as the janitorial service, and I was able to streamline it by reorganizing how often various jobs were done. Some jobs that should have been done once a year were being done once a month. Doing them once a year left more time for people to do jobs that needed to be done daily.

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ACRES U.S.A. When did you get back into the sunshine?

JEAVONS. Farming kept pulling at me, and in 1972 I joined Ecology Action, a group in Palo Alto, California that had been recycling glass and metals. They'd been so successful at it that it was taken over by the city. The members of the group met late in 1971 to discuss what to do next, and they decided to do an organic gardening store and an educational center and combine those two into one because they were complementary. A bicycle workshop was also developed. The organic gardening/mini-farming project was called Common Ground, and the board of directors said we could go ahead with it as long as we could raise the money — and I'm still raising money for it after 40 years.

ACRES U.S.A. Did your experience in streamlining systems give you a special insight into how you could garden in ways that were less backbreaking or labor-intensive than the usual?

JEAVONS. I think so. There are a number of aspects of this. What I'm doing now is sort of a combination. Since I have an interest in international relations and development, combining that with farming, with the business side, and with the systems analysis side I hope creates a more effective, easier to use and human-friendly way of raising food. Before I began the project in 1972 I spent a year amassing all of the San Francisco wholesale market prices, week by week for every week in the year, for all of the vegetables and soft fruits. This wasn't an easy job because they didn't tell you that it's so many cents a pound. They said it's so many dollars a lug, and the different lugs and boxes weigh different amounts, even for the same vegetable. Sometimes they weighed different amounts at different times of the year. I had this big master chart, and I found out some interesting things. I found out that if you want to sell celery, the best time to sell it is in the first part of December. You can get double the price, and the reason is because the supply is used up at Thanksgiving and there's a big demand coming up for Christmas. I learned that you could earn a lot more money from cauliflower than broccoli. In fact,

you can make eight times the dollars per unit of area per unit of time with cauliflower than with broccoli. A lot of it has to do with the weight of the broccoli head — cauliflower is much more dense. Also the cauliflower sells for a little bit more per pound, but the big thing is the weight of the cauliflower.

ACRES U.S.A. It sounds counter-intuitive because broccoli is more popular.

JEAVONS. It is more popular, and what surprised me is they're both brassicas and they both take approximately the same amount of time to grow. I always thought they weighed the same, but when I developed the master charts and ran it all out I said, "Wow, this is interesting and exciting."

ACRES U.S.A. What did you do to make the work more manageable?

JEAVONS. In terms of easier, we use a process called double digging, where manually we prepare the soil 24 inches deep. This is really important, because if you have good soil structure down 24 inches deep you've got nutrient cycling 24 inches deep. In farming, whether it's organic or chemical, currently the soil is only prepared about 6 inches deep, and unless you have a really good soil already you only have ease of nutrient cycling one quarter as deep. When you make it deeper, then you can put all the plants closer together so there's about four times the plants per unit of area per unit of time, and the nutrient cycling in the soil to support that. Using the double-digging technique in 1972 certainly was strenuous. Over time I've found ways to make it easier, so now we have a Grow Biointensive DVD that shows how to dig with almost no effort. I once taught one of the best market gardeners in California how to double dig, and she learned how to do it without any effort. She came back to me two minutes later and said, "John, I just realized something. I really like to work." John Dromgoole was the Southwest region representative for Rodale when I taught in Austin, Texas. After seeing the way we double dig, he said, "John, I now realize nobody's ever really taught us how to dig. You don't really need to use much effort. You can just use your body weight; you shift your body weight and you let gravity and the tool do the rest." If you're digging, you're not digging right. If you're letting the process do it for you, you're digging right.

ACRES U.S.A. It's tempting to wonder how many other techniques were developed and forgotten and are ripe for revival.

JEAVONS. The French gardeners, who developed over a 300-year period peaking in the early 1900s, broke into guilds. These were like extended families, and they had a cradle-to-grave social system because their farming was so effective and made a good income. But they had different ways of growing crops that enabled them to bring cantaloupe, for example, to market four to six weeks earlier than anybody else. That's where they made most of their net income. They used all sorts of special tricks and pieces of knowledge. What Ecology Action has been doing is relearning how people 5,000 years ago in Ethiopia, 4,000 years ago in China, 2,000 years ago in Greece, and 1,000 years ago in the Mayan culture structured their biologically intensive forms of raising food. Along the way we've found tricks and little processes that make a big difference. For instance, if you transplant your carrots you can get double the yield that you get if you directly sow them. We've replicated this more than once.

ACRES U.S.A. Why is that?

JEAVONS. I don't know all the reasons why, but I think it's because the soil is looser at the point where you transplant the seedling. When you put a seed in, it doesn't germinate for about two to three weeks, and the soil is more compacted by then. Some of the nutrients are less available. And it takes you a fair amount of time to thin a carrot bed that's been broadcast, but it doesn't take much longer to transplant than it does to thin. For many people around the world who want to eat, a little bit of extra time isn't an issue while a lot more food is wonderful. What we found out is that there are lots of economies of small scale. One of them is that we use three to eight times less water per pound of food produced with this biologically intensive system. We use 50 to 100 percent less purchased nutrient in organic fertilizer form. We use 94 to 99 percent less energy in all forms in producing food.

ACRES U.S.A. Can you cite some extended benefits of those savings?

JEAVONS. There's a human side to all this that's just terrific and I'll mention one of those sides. In India there are millions of children who have eyesight problems and brain development issues

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because they don't get enough vitamin A and iron during the first six years of their life. You can grow the missing vitamin A and iron in just a few square feet with dark green vegetables such as collards or parsley. It's so simple that once the children are older, like 4, 5 and 6, they can actually grow their own food.

ACRES U.S.A. How long did it take to develop the fundamentals of biointensive growing?

JEAVONS. We spent the first seven years breaking the code of economic mini-farming. We worked on everything — economics, diet, and sustainable soil fertility — but we focused particularly on income mini-farming. During the second seven years we worked on complete diet mini-farming, and I'll come back to that. Then for the last 26 years we've worked on sustainable soil fertility, which has been the most challenging code to break. Organic farming is not fully sustainable because it imports 50 to 84 percent of its inputs — composts, manures and organic fertilizers — from other soils. Even though we're building up our soils with organic farming, we're depleting other soils. Worldwide there are as few as 34 to 49 years of farmable soil left.

ACRES U.S.A. Not to mention challenges like the droughts hitting many parts of the world currently, including part of the U.S.?

JEAVONS. It's more than challenging. Biointensive has the potential of using as little as 88 percent less water per pound of vegetable produced, and it has the potential of using as little as 67 percent water per pound of grain produced. We've found that by growing seedlings in flats and transplanting them, the amount of water you save if you choose the right crops is enough to feed half a person to a whole person for an entire year compared with direct sowing.

ACRES U.S.A. Let's return to the diet component you mentioned.

JEAVONS. You asked about how my systems analysis experience helps in farming area and food raising. One of the things we discovered is that special root crops, and there are seven of them, produce a tremendous amount of calories per day per unit of area compared with grains and compared with soybeans. These special root crops can produce as much as five times the calories and more compared with soybeans per unit of area, per unit of time. Here's another way of looking at it. If you have just 100 square feet of wheat and Grow Biointensive intermediate yields, you produce about 15,000 calories. But if you have potatoes, you're going to be producing something like about 70,000 calories. That seems fantastic, and it is. But the wheat takes eight months to grow and the 65-day maturing potato takes only two months to grow, so when you figure out the effectiveness on a per-month basis the potato is incredible! Now, we're not trying to encourage another Irish potato famine because you should have more crops than just potatoes, and we do. Potatoes or sweet potatoes, leeks, garlic, salsify, Jerusalem artichoke, and a few others — if they're part of your diet, they're going to greatly reduce the amount of area it takes to grow your food. Growing the food for the average U.S. diet takes an average of about ¾ of an acre, about 30,000 square feet. With a different diet and with biological intensity, we're able to grow all of the nutrients you need for one person for all year in 4,000 square feet. That is seven-and-a-half times the area efficiency. It's not the same diet. It's got a lot of root crops in it. It has some grain crops in it, but in an increasingly desertified world with less farmable land it's the type of diet design that is healthy. And people just may have enough land to grow it.

ACRES U.S.A. What are your thoughts about the heavy reliance on soybean and grains in this country?

JEAVONS. I think I have one way that will make the challenge clear for people. Certainly it did for me. If you grow soybeans at the kind of yield that they normally produce, which is not a high yield, it takes about 12,000 square feet to grow all of your calories. But if you grow using a cropping plan like we do, then 60 percent of the area is in what we call compost and calorie crops. That's your grain and seed crops such as wheat, corn, and amaranth. They grow a significant amount of calories and a very large amount of compost material. Then in 30 percent of our area the goal is to grow the special root crops that produce so many calories per unit of area per unit of time. In 10 percent of our area we grow vegetable crops for any vitamins or minerals that are not in the other two kinds of crops, and also for income. With this particular kind of combination you can grow all your calories for one person for all year in about six beds — 600 square feet not 12,000 square feet. If you grow a mixed diet plan with 40 beds, then that would be 4,000 square feet rather than 12,000 square feet. Many of the people in the world, especially low-income people, are only going to have about 4,500 square feet of farmable land.

ACRES U.S.A. Have these ideas been implemented in India, for example?

JEAVONS. There are currently people in 142 countries using Grow Biointensive sustainable mini-farming practices. These aren't giant projects, though sometimes large numbers of people are affected. It's reported that there's as many as 2.5 million farmers in Kenya using biointensive practices, and over 2 million people in Mexico have been taught biointensive. In India we had a wonderful experience. In 1976 we got a list of alternative technology agriculture locations around the world. We sent out a letter saying we're doing this ages-old but new-to-us biologically intensive practice of food raising. It produces higher yields and uses less water, and if you're interested we'll send you a free manual showing how to do it. Only one person in the whole world answered, and that was Dr. Seshadri in Madras, India. We sent him a book, and they ran the test with 22 low-income families who had never farmed before. They had sandy soil, and the only fertilizer they had was fresh manure. By the end of their third season these farmers were getting 75 percent to 100 percent

of the yields of the good farmers in India. Now good farmers there average about double the regular average. These formerly inexperienced people were in the upper 15th percentile of yields in India. I don't attribute it just to biointensive. I attribute it to the great teaching of the late Dr. Seshadri and his wife Chitra.

ACRES U.S.A. Nature takes many, many years to create rich topsoil. How do you address this reality?

JEAVONS. The thing that excites me tremendously is the result of a master's thesis at the University of California at Berkeley in the Soil Science department. We discovered that Grow Biointensive has the capacity to build the soil up to 60 times faster than happens in nature, and in fact for every pound of food eaten it can produce up to 20 pounds of farmable soil. This is in contrast to conventional practices in the United States, which result in six pounds of farmable soil getting lost. In developing countries on average 12 pounds of farmable soil are lost. In China 18 pounds of farmable soil are lost. We're talking about just the reverse being possible, potentially, with biointensive practices. At a time of increasing desertification, at a time in which there is less and less farmable soil left per capita in the world, this is exciting. When I teach workshops, one of the things that I say is, "Here's the most important thing I want everyone here to do for a better world and a better future and a better diet. I want everyone to stop growing crops and I want instead for everyone to grow soil."

ACRES U.S.A. What do you say next?

JEAVONS. If you grow soil, you have to grow crops, so you didn't lose anything. The reason for growing crops isn't just to eat; it's to grow soil. If you grow soil, the soil will provide for you abundantly. This is something we all need to start focusing on — growing soil. To do that we use the recipe I mentioned earlier — 60 percent compost and calorie crops, 30 percent special root crops, and 10 percent vegetable and income crops. It is a goal. There are other percentages that

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can work. In the tropics it's 50 percent, 30 percent, 20 percent for a 12-month tropical growing season. The important thing is to realize that we've got to feed the soil. Too much of what we're doing now is like milking a cow every day and not feeding it. The cow here that's nurturing us is the soil and what a wonderful opportunity. I'm thinking of a quote from Voltaire in his book *Candide*. On the last page Candide says, "The whole earth is a garden, and what a wonderful place it would be if each one of us just took care of our part of the garden." I would say our mini-farm, because we need to realize our gardens are powerful farms. There are a lot of challenges happening in the world. There's peak water — it's incredible the degree to which people aren't having enough water, but you're experiencing that in Texas right now. And people are experiencing that in different locations globally. But Ecology Action has a theme, a philosophy, of changing scarcity into abundance. If normally it takes one unit of water to grow a certain amount of food, with Grow Biointensive — if it's practiced properly — you can grow the same amount of food with 1/3 to 1/8 a unit of water. You've just changed from a situation where you didn't have enough water to where you have more than enough water. Rain has to come down of course — some.

ACRES U.S.A. What happens if it's not practiced properly?

JEAVONS. If you don't use Grow Biointensive properly, because it's so productive — it has the capacity for higher yields — you can deplete the soil 2 to 6 times faster than other techniques.

ACRES U.S.A. Do organic farmers with acres to manage — not gardeners — ever come to you for advice on how they can reduce their inputs?

JEAVONS. We have a little bit of that, not a lot. I expect to see a lot more in the future because if you can reduce your inputs, that improves your profit line tremendously. Another thing we experience is that we have only about 5 percent crop loss due to pests, so that's another way that things are easier, and for the production farmer it can mean more income. Ever since 1972 when we began, we gave classes every Saturday and we gave tours every Saturday. Now we're north of where we were, and we have four one-day tours a year and two three-day workshops — one in November and one in March — and all this information is detailed online. We have over 50 publications addressing different topics, like how to grow all your seed in the smallest area while preserving genetic diversity, online now so everyone can get started easily. We have a 12-page *How To Grow More Vegetables* with almost no numbers in it. It's in our self-teaching section.

ACRES U.S.A. Can people restricted to limited amounts of growing space use your techniques to insulate themselves from economic shocks by reducing their grocery budget?

JEAVONS. By whatever techniques including ours, you can grow in your apartment or in your small yard and greatly reduce your bills at the grocery store. It depends on how long your growing season is and which crops you grow, but you can grow up to $500-$1,000 worth of vegetables and soft fruits in as little as 100 square feet. There are some wonderful books out on container gardening, and both editions of *The Apartment Farmer* by Duane Newcomb are exciting in the opportunities that Duane offers you for balcony gardening, flowerpots, window boxes and so on. There are even special varieties of seed that are smaller and suited for window box cultivation.

ACRES U.S.A. Biointensive techniques are applicable even on a very small scale?

JEAVONS. Absolutely. There's no question. You can do it in a square foot; it's better if you do it in a square yard, three feet by three feet, because you get a better mini-climate. You use less water, you get higher yields, and you have fewer insect and disease problems. You can do it in pots, but if you do it in a pot you just have one plant, and I don't think we can claim that's biointensive. It's just good gardening.

ACRES U.S.A. Is there an upper limit to how far you can scale your techniques?

JEAVONS. In 1911 the Chinese were farming their whole country in biologically intensive agriculture. There's no upper-scale limit in that way — China's a big country. However, if we're talking about a single-family farm, is there an upper limit? I have a friend who farmed three acres biointensively in Pennsylvania with just four people, and it was a production farm. It uses more people if you begin to get into the acre range, but what I'd like to encourage people to do is think about income range. If you choose your crops right, you can have a good income on less than an acre. You can even have a good income on a quarter-acre or half-acre. Marketing is half of it. It isn't just growing it.

ACRES U.S.A. Did you originally draw a lot of inspiration from biodynamics?

JEAVONS. First of all, my mentor was Alan Chadwick, an Englishman. He was a phenomenal individual. He called his method that he developed and used at the University of California at Santa Cruz in the '60s and '70s the Biodynamic/French Intensive method. But he only used one of the biodynamic preparations some of the time, so a lot of biodynamic members felt he wasn't biodynamic. But the fact that he grew healthy soil, healthy crops, beautiful flowers and good tree fruits is beyond question. He was just amazing, and his apprentices were wonderful. Over time we changed the name of the method we used to Biointensive, and that was unique to us but it went into the public domain. So we changed the name to Grow Biointensive with a registered trademark after it. People were beginning to use biointensive farming with pesticides, and we wanted to be sure that when someone was using Grow Biointensive they were sure that pesticides weren't needed and weren't being used.

ACRES U.S.A. Did he teach regular classes?

JEAVONS. Our work grew out of Alan Chadwick's mentoring by what he did in his garden and his life, and I took classes from him and tutorials from him. The classes I took were public classes that hundreds of people attended.

ACRES U.S.A. What have you picked up from looking into techniques developed in the distant past?

JEAVONS. We're rediscovering these techniques that have been used for millennia in different areas. I'd like to mention three of them because people think that manual food raising is going to be too much work. As we re-learn and rediscover farming skills, initially it is going to be a lot of work sometimes, no question. Most of us are farming illiterate. It didn't used to that way in this country, but it's been evolving that way. The Chinese call their farmers "living libraries." I want to mention another culture that is 10,000 years old. They're not still doing this, but 10,000 years ago with einkorn and hornemanni wheat there was a culture in northern Iran that raised all their calories in just 20 hours a year. The anthropologists have been able to determine that they spent just 20 minutes a day for 60 days. The hornemanni variety of einkorn is the earliest spelt wheat, and spelt wheat today derives from it. It's not the original though sometimes you can get ancient spelt wheat bread.

ACRES U.S.A. Do you have an example from Asia?

JEAVONS. A group of people who are still active are the Hanunoo in the Philippines. The Hanunoos are not literate. What they do is spend about 80 percent of their table conversation talking about farming and how to farm. Their children play farmer. The Hanunoo have a 200-crop, five-year rotation system that grows 40 different varieties of rice. No matter what the year brings — too hot, too cold, too wet or too dry — they get a good yield of calories. What we have there is a culture that in their minds, hands and hearts have one of the most sophisticated rotation systems in the world. If you go to most of our agriculture colleges and universities, you won't find something nearly as complex. The Hananoos are living libraries.

ACRES U.S.A. How about the Mayans?

JEAVONS. The Mayans a thousand years ago, who survived when other cultures were waning, raised their food with neighborhood biologically intensive gardening. This is something everybody can do wherever they are.

ACRES U.S.A. Have you been able to effect a technology transfer from a group such as the Hanunoo?

JEAVONS. No, we're not aware of what their system is. From articles we know some of their system, but the working details we don't have. There are a lot of wonderful areas of studies, and this is one of them. Another one is how the Navajos plant maize seed or corn seed very deep in sandy soil and are able to grow corn in areas with as little three to five inches of rain.

ACRES U.S.A. Northern California seems like an origin point for many of the ideas about growing and preparing food that are transforming American life from farm to dinner table. Have you drawn sustenance and inspiration from your context and contacts in the region?

JEAVONS. Absolutely. Alice Waters and I are friends. She's written the preface to *How To Grow More Vegetables* and she notes how effective biologically intensive food raising has been in making good food for restaurants. All of northern California is a very nurturing culture for all this, and it's wonderful to be surrounded by lots of people who are pushing the biological envelope in raising

food toward a much more sustainable culture. It's an exciting time for all of us.

ACRES U.S.A. Did Alan Chadwick play a critical role in acting as the spark plug, so to speak, igniting this movement?

JEAVONS. Absolutely. He died in 1980 but his spirit lives on. His energy was implanted in so many projects and people.

ACRES U.S.A. That's the best outcome any of us can hope for.

JEAVONS. Absolutely.