



Proceedings of the 7th National Small Farm Conference

...Creating and Sustaining Small Farmers and Ranchers...

VIRGINIA BEACH CONVENTION CENTER • VIRGINIA BEACH, VA

September 20-22, 2016

PROCEEDINGS OF THE 7TH NATIONAL SMALL FARM CONFERENCE

Theme: *Creating and Sustaining Small Farmers and Ranchers*

Venue: *Virginia Beach Convention Center, Virginia Beach, VA*

Date: *September 20-22, 2016*

THE 7TH NATIONAL SMALL FARM CONFERENCE WAS HOSTED BY



WITH THANKS TO OUR SPONSORS



Proceedings of the 7th National Small Farm Conference

The 7th National Small Farm Conference, "*Creating and Sustaining Small Farmers and Ranchers*", was hosted by Virginia State University, in partnership with Virginia Tech and various agencies from the U.S. Department of Agriculture. During the conference, presenters shared successes in small farm and rancher activities, as well as innovative ideas in research, extension and outreach to strengthen collaboration and partnerships among state specialists who work to ensure that small farmers and ranchers continue to have a place in a rapidly changing socio-economic environment. The conference also served as a forum to discuss the results of research geared towards addressing challenges facing small farmers and ranchers. Strengthening and expanding partnerships created at the six previous National Small Farm Conferences was a priority for the Virginia Beach meeting. The 7th National Conference consisted of short courses, oral and poster presentations, exhibits, success stories, and educational tours within the environs of the City of Virginia Beach, and the Eastern Shore of Virginia.

Proceedings Committee

- Denis Ebodaghe (*USDA-NIFA*)
- Dave Lamie (*Clemson University*)
- Laban K. Rutto (*Virginia State University*)
- Kim Niewolny (*Virginia Tech*)
- Nii Tackie (*Tuskegee University*)
- Reza Rafie (*Virginia State University*)
- Scott Elliott (*USDA-NIFA*)
- Beth Nelson (*University of Minnesota*)
- Shaniqua Armstead (*USDA-NIFA*)
- Ngowari Jaja (*Virginia State University*)

Welcome to the 7th National Small Farm Conference

Dear Conference Participants:

On behalf of the conference planning committees, our conference host Virginia State University in partnership with Virginia Tech, conference sponsors, land grant colleges and universities, community-based organizations, USDA Agencies, small farmers and ranchers, foundations, State Small Farm Program Coordinators, other public and private sector organizations, other stakeholders and customers, welcome to the 7th National Small Farm Conference. The conference's theme, "***Creating and Sustaining Small Farmers and Ranchers***," provides a forum to discuss programs and services that have been created as well share strategies to sustain more farmers and ranchers. For discussion at this conference are issues raised by stakeholders from land grant colleges and universities, community-based organizations, farm communities and others working with small farmers and ranchers. Sustaining programs is of essence if we are to promote and encourage innovative ideas that can be replicated in order to enhance economic opportunities and improve the quality of life for small farmers and ranchers nationwide. This conference builds upon the successes of previous conferences held in Nashville, Tennessee in 1996; St. Louis, Missouri in 1999; Albuquerque, New Mexico in 2002; Greensboro, North Carolina in 2005; Springfield, Illinois in 2009; and Memphis, Tennessee in 2012. This is a train-the-trainer conference consisting of several preconference short courses and program efforts focusing on critical areas such as marketing opportunities, traditional and alternative enterprises, food production and safety, risk management, urban agriculture, outreach, training and research and extension priorities.

Tuesday's opening plenary begins with greetings and remarks to set the tone and direction of the conference while providing opportunities for networking. On Wednesday, the highlights include a keynote followed by farmers' panel on small farm opportunities and challenges, and closing out the afternoon with educational tours. Thursday highlights presentations from series of tracks, networking lunch followed by a closing session, entertainment and drawings.

Many thanks to the faculty and staff at Virginia State University for hosting this event in partnership with Virginia Tech and USDA agencies, conference sponsors, the local Planning Committee, the Conference Planning Committee, and others for their hard work over the past two years in planning for the 7th National Small Farm Conference.

Sincerely,



Denis Ebodaghe, Ph.D.
*Conference Chair &
National Program Leader for Small Farms*



William Crutchfield
*Conference Chair &
Director, Small Farm Outreach Program
Virginia State University*

Table of Contents

	PAGE
Welcome Remarks	ii
Keynote Speakers	iii
<u>TRACK# 1: Traditional and Alternative Farm Enterprise Development and Practices, Including Protected Agriculture (PA) and Urban Agriculture Opportunities for Small Farmers</u>	
<i>Trees and Livestock Together: Silvopasture Research and Application for Virginia Farms.</i> Gregory E. Frey, John H. Fike, Adam K. Downing, Marcus M. Comer, Timothy A. Mize and Christopher D. Teutsch	1
<i>Strategies to Enhance the Sustainability of Small-Scale Goat Production.</i> Uma Karki	8
<i>Introduction of Vegetable Soybean (Edamame) as an Alternative Crop in Southside Virginia.</i> Laban K. Rutto, Shuxin Ren, Cliff C. Somerville, Theresa Nartea, Chris Mullins, Guo-Liang Jiang and John K. Raiford	14
<i>Specialty Crop Production Initiatives with Limited Resource Farmers in Texas.</i> Peter A. Y. Ampim, Billy Lawton, Russ Wallace and Aruna Weerasooriya	19
<i>Using Row Covers to Improve Sustainability of Vegetable Crop Farmers in Temperate and Tropical Climates.</i> Ramon Arancibia	26
<i>Characterizing High Tunnel Microclimate in Hardiness Zone Seven and Eight of North Carolina.</i> Sanjun Gu, John E. Beck and Joseph A. Moore	29
<i>Small Farms: Alternatives to Meet New Challenges from Changing Climate Conditions.</i> Cynthia Rice, Buddhi Gyawali, Marion Simon, Louie Rivers Jr., and Bijesh Mishra	35
<i>The Promise of Urban Agriculture: Policies and Planning in Support of Commercial Urban Farms.</i> Anu Rangarajan and Molly Riordan	41
<i>Sustainable and Urban Agriculture Program (SUAP) at Virginia State University.</i> Leonard Githinji	46
<u>TRACK# 2: Sustainable, Organic, and Locally Grown Food Production and Food Safety</u>	
<i>Optimizing Nitrogen Management on Organic and Biologically-Intensive Farms.</i> Douglas Collins, Andy Bary and Tuong Vu	50
<i>Extension of Local Food Production in Idaho Using High Tunnel Technology.</i> Jennifer Jensen, Ariel Agenbroad, Tony McCammon and Steve Love	56
<i>Principles Guiding Practice: A Case Study Analysis of the Principles of Sustainable Agriculture for Diverse Farms.</i> Marilyn E. Swisher, Kelly N. Moore, Christine Kelly-Begazo and Kaylene Sattanno	61
<i>The Benefits and Challenges of Machinery Sharing Among Small-scale Fruit and Vegetable Growers.</i> Linda Naeve and Georgeanne Artz	65
<i>Sustaining Interest: GAPs Outreach for Small Scale Direct Market Produce Growers.</i> Meredith Melendez and Wesley L. Kline	70
<i>Success Beyond the Workshop: Reinforcement with On-Line and Take Home Resources for Estate and Farm Transfer Planning.</i> Robin Brumfield and Meredith V. Melendez	73

Small Farms: Alternatives to Meet New Challenges from Changing Climate Conditions

*Cynthia Rice, Buddhi Gyawali, Marion Simon, Louie Rivers Jr., **Bijesh Mishra** (Kentucky State University)*

Abstract

Exploration of alternative methods of farm production is necessary if small, socially disadvantaged producers are to compete with larger conventional farms. Ideas such as organic, sustainable, bio-intensive, silvopasture, inter-cropping and other methods such as no-till and low till are new concepts which are not necessarily something a large farm can implement but that a small farm could adopt and use as a selling point or for financial growth. Development of apps to educate, train, and connect with others (farmers, wholesalers, value added resellers, retailers, etc.) allow farmers to explore options which may increase their brand and marketability. This presentation is based on years of reading, researching and practical applications as new techniques and information became available and evidence supporting climate change was documented. No one site or person molded the thought processes behind this paper but hundreds of talks, webinars, seminars, classes, papers and images influenced the writing of this paper over the decades. Heartfelt thanks to the many pioneers and their work in sustainability.

Introduction

Climate change and its effects are an increasing source of concern for nations. Addressing climate change issues that face farmers, and alternatives for regaining productivity and profit are the focus of this paper. In the past several years, workshops and training have dealt with financial management, know-how or practical farm management and education in new practices or new areas of growth in farm production. There was a typical pattern which was followed in an annual cycle dealing with animal and plant production and harvest with occasional new technology or practices. Times change and so do needs – today's farmers need to adapt in order to remain viable in the face of climate change. Training and workshops must similarly change to keep up with the new REALITIES of hotter and drier weather as well as changing rainfall patterns.

Factors Affecting the Changing Face of Farming

Farmers are traditionalists in many areas of their work such as always planting in the spring and harvesting in the fall. Unfortunately, things don't remain the same, especially with accelerating climate change. The long term effects of climate change will be manifested in changing vegetation patterns and variations in species composition as both invasive and native species recede from the south and advance to the north. What this means is that species such as apples which require a certain amount of chilling time, will become less productive where they

currently are and will become more productive in areas north of current orchards, how far north only time will tell.

Small farms are uniquely suitable to adapt to climate change. Many small areas/plots allow for many different growth patterns. Different markets and niches including wholesale, restaurants, retailers and ethnic/cultural markets are available to absorb seasonal produce. Small farmers are naturally positioned to be leaders in new techniques as different methods are tried at small scale. They are also leaders in crop introductions as alternative crops are tried and market bases are developed. Due to their involvement in growing specialty or alternative crops, they are able to develop relationships with local restaurants as new crops are provided for signature dishes.

Farmers are caught in unplanned and unexpected situations. By the very nature of farming, weather is one of the driving factors of agricultural production. Issues such as drought and flooding, cooler and hotter temperatures and possible wet and dry monsoon planting seasons are becoming important factors of farm decision making. These situations are causing farmers to suffer reduced yields or crop loss. These weather occurrences can be devastating to planting and harvesting schedules and the frequency with which they occur may lead to farmers losing their farms due to continued economic loss. Small farmers can adjust easier to unplanned and unexpected situations. They can plan short and long term solutions such as developing micro-climates and planting different crops with different needs at different times. By planting smaller plots/area, farmers do not place all their revenue resources in one or two major crops. Continued cropping at a manageable scale requires fewer workers who work throughout the year meaning less need for training/retraining. With production able to occur almost year round, especially with season extender devices such as greenhouses, loss of one crop does not lead to loss of all revenue due to several revenue streams.

Footprint/Carbon Sequestration

A bio-diverse environment will include a cycling of nitrogen and carbon into and out of the ground (hopefully more in than out) as well as organic matter which will add to the fertility year after year. When farmers interact locally, less fuel and better tasting food which is allowed to ripen individually combined with other factors helps to reduce their carbon footprint. Small farms have a small carbon footprint with lower transportation costs, also. They are more involved in their local community in areas such as local fertilizers/animal waste, local storage, local sales, local customer base with less competition and local value added products.

Alternative Maintenance

In terms of alternative maintenance, allowing crop residue to stay in place as organic matter will lower labor costs, lower chemical costs, lower irrigation/water costs, lower fertilization costs, increase bio-diversity, and contribute to a healthier environment. Other alternative maintenance

practices such as weeds left as shade, support and trap crops (bio-control) with taller growth helps to provide a living mulch which retains moisture at ground level. With more organic matter there is more fertile land and less of commercially produced fertilizers can be used in effect conserving dwindling resources. Small farms are more likely to be bio-diverse allowing a healthier environment with more micro-organisms in variety and quantity and generally tend to use environment friendly practices.

Polyculture

For small farms, the capability of moving from a monoculture to a polyculture practice allows the work to be divided into segments to deal with different crops types. Harvests and planting can be done at different times or continually in small segments, which is well suited to a small farm. Farmers can have a continuing source of revenue which can allow them to budget better and borrow less. They can also, plant earlier and later in the season even through the winter months by use of crop extenders which allows them to produce more than previously possible. Small farmers can use innovative approaches such as hydroponics, aquaponics, high and low tunnels, as well as greenhouses, hoop houses, and row covers (different seasons and different crops). Using these crop extenders at different times enables small farmers to achieve continuous or near continuous cropping. Polyculture allows for more types in smaller quantities which could be spread out over a longer period to adapt to climate change issues such as reduced and increased (monsoon type) rainfall levels. With polyculture, fertilizer is used in smaller quantities on crops needing it (no/less nitrogen loading into waterways). Planting and harvesting can be spread over multiple microclimates for better production. The loss of a crop does not mean the loss of all income and farmers are better able to absorb and deal with smaller losses. Polyculture can result in multiple schedules with better labor management and continued employment.

Dry Farming vs Irrigation

A major consequence of climate change will be drier and hotter weather and less rainfall. Traditional crops may not survive or may produce less without additional water or water retention methods. Alternative crops requiring hotter temperatures or less water may be the new cash crop. Small farms can apply spot irrigation where it is needed based on crops currently growing in a specific location. Small plots can prevent or limit erosion because of the different water requirements and irrigation timing. Crops can be placed where they can do best, based on microclimate and nutrient need. Raised beds can be developed for intensive gardening, special needs such as acid or alkaline soil and to drain and/or retain excessive water/moisture allowing faster planting in rainy seasons. In-ground (below ground level) planting where water can be trapped for plant use, and prescriptive mulching are all possible on small farms.

Low Till/No Till

Less disturbance of soil leads to less work and more results. Fertility will increase due to crop residue being composted back into the soil and less time is spent on plowing, disking, and other practices associated with conventional tillage. More organic matter is retained cutting down on the amount of imported organic fertilizer that may harbor disease pathogens or invasive plant seeds. This will also give native plants a chance to multiply improving biodiversity within and above the soil. Less erosion and more moisture retention can occur because the soil is able to retain the structure which contributes to less drainage away from the soil and more drainage down into the soil. Small farms can allow micro-organisms' habitat to expand enriching the soil because smaller plots may be less subject to tillage. Due to differing planting cycles, the farmer can allow soil structure to regulate through thaw and freeze cycles creating air pockets letting gas exchange with the atmosphere. In such small farms, the soil is also able to store up water within the different layers of soil and nutrients increase due to organic matter accumulation.

Natural Fertilizers, Pollinators, Alternative Crops and Crop Rotation

Due to small spaces, synthetic fertilizers can offset the balance of the soil leading to only one crop being suitable for an area. Depletion of specific nutrients due to crop needs can be offset by crop succession. Chemical persistency is not generally a problem as naturally occurring fertilizers break down easily. Pollinators thrive in a no/low chemical environment, which is a high priority in the face of bee decline through colony collapse and destruction of butterfly habitats. Small farms also may be more organically inclined. They tend to have limited use of additional fertilizers as they strive for sufficient organic (as in non-synthetic, not as in US organic standard) production. Natural compostable organic matter is often used with no additives and are not generally hazardous in amounts used. Natural components provide nutrients with usually no residue and GAP (good agricultural practices) is often used. With fertilizer being naturally produced there are often no additional costs and the absorption of waste into the soil releases nutrients back into the soil quicker without bringing in additional salts from commercial fertilizers. This in turn helps with the natural pH balance.

Pesticides/Herbicides/Fungicides/Insecticides vs Biocontrol

With current commercially produced pesticides/herbicides/fungicides/insecticides containing synthetic and often persistent chemicals, many small farms are looking at bio-control as a viable replacement especially since these commercial products, while not harming the current crop, may adversely affect future crops, thus limiting crop rotation possibilities. With the commercially produced products, long term effects may not be known as evidenced by even popular items being pulled off the shelves. If they must be used then a localized, non-drift specialized and not broad spectrum product is recommended but on a small farm drift can affect other crops, animals or even people. Synthetic or lab produced may be shelf stable causing

chemical persistence in soil and water and may be linked to pollinator decline which decreases some crops' yields. So, generally small farms have little or no pesticides/herbicides/fungicides /insecticides use and look to bio-controls which are less damaging to the environment. With no commercial treatments, a proper growing environment where bio-controls are dominant allows plants to develop resistance to micro-organisms or be protected by trap crops, predatory insects, birds and other organisms.

Animal or Plant, or Animal and Plant

Animals may need different housing requirements such as taking advantage of coolness from earth (regulating with cool pipes or partially sheltered by earth to insulate from heat or cold). Positioning structures and watering areas to create cool spots are possible in small farms in relation to small plot usage. Small farms can take advantage of micro-climates through strategic building and vegetation placement (trees, shrubs, and water/irrigation ditches). Work animals and plants as a holistic approach (chicken tractors, movable paddocks) to enhance the production capabilities of small farms. Small farms can work animals into landscape or plants into microclimates which exist (orchard, forest, north slopes) or are created reducing controlled housing or man-made housing with their requirements. Free roaming or paddock roaming allows waste to be spread over land fertilizing ground, and preventing methane buildup while lowering contributions to greenhouse gases. Lower feed requirements due to pasturing animals letting them forage crops and natural food which builds muscle not fat. Using animals to help maintain the health of the land is a natural cycle which usually is environment friendly. Nutrient balance in food with little or no run off into water sources or escape into the atmosphere is a positive aspect of holistic farming which again is a practice well suited to small farms.

Invasives vs. Natives

Invasives such as kudzu, honeysuckle, and many weeds which thrive in the southern states may start to appear in Kentucky as natives migrate northward. If invasives establish themselves then small farms can find uses for them as non-cultivated food or forage. As soils dry out and barren patches appear invasives will enter unless farmers are prepared with heat tolerant alternatives. Small farms being bio-intensive leave little or no ground bare so there is less room for invasives. Little or no herbicides use will help the ground from becoming bare and keep native plants in place. Natives usually provide an ecological service such as deep root penetration to aerate soil. Natives thrive in soils which provide the nutrients/substances they need. The natural cycle of succession plants as planting area moves from bare ground to perennial increasing fertility (annual, biennial or perennial) so small farms can plan and use multistory plantings as natural succession takes place.

Historical/Traditional and New Norm

Traditional farming practices still are very much a presence. It will continue to be used for many years, but to feed the growing population there will be less imports as markets get more competitive. By adding small farms to the mix, they add to food security, help to keep prices low in comparison to other countries. With the climate changes occurring, traditional big farms may well become unfeasible to operate and having small farms already in place will ease the transition. Hoop house, high tunnel, row covers can mediate unusually high or low temperatures. Raised beds for new drainage problems can help mitigate changing rain patterns by better drainage and less disturbed earth can hold more moisture reducing irrigation needs. Smaller areas are easier to spot check to catch the onset of diseases due to too much or too little rain. Small farms are able to mulch easier or set berms or wells around plants to keep water in a set area. Based on size of areas small farmers may hand pollinate or attract pollinators with plants.

Conclusion

Farmers must become more resilient and seek ways to cope with the coming change while continuing to make a decent living. Plans put in place now will be refined and be able to provide food and income as climate change accelerates. Small farmers will become leaders on the forefront of food security for our communities and the nation. Climate change is real and farmers have to become more aware and react to the problems facing them (severe weather including drought and flooding and unusual high and low temperatures). Small farmers are more resilient to the effects of climate change and their experiences and skills to cope with the adverse effects of climate change can be useful for making larger farms resilient and sustainable.