



# Low-Tech Assistive Technology for Farmers Worldwide

Wednesday, January 29

2020 AgrAbility Virtual National Training Workshop

Ned Stoller, ATP  
National AgrAbility Project  
Purdue University

# Basic Webinar Instructions

- Audio available through computer or phone.
- Check sound via Communicate menu at top left
- Closed captions: use arrow to expand or contact the Media Viewer window.
- Expand/contract any of the windows in the right-hand column with the arrows. Expand/contract the size of the right-hand column.

# Basic Webinar Instructions

## Questions and comments

- Go to the Chat option in the right-hand column. Please send to “All Panelists”. Enter message in box below TO and hit enter/return. You may enter questions about the presentation at any time.
- In addition, during the Q & A period, you may click the “Raise Hand” icon on the attendee list to indicate that you have a question. We will do our best to enable your microphone or phone connection.

# Basic Webinar Instructions

- Please let me know if more than one person is viewing at your computer
- 4 quick survey questions + opportunity to share comments
- Session recorded and archived with PowerPoint files at [www.agrability.org/online-training/virtualntw](http://www.agrability.org/online-training/virtualntw)
- Problems: use chat window or email [jonesp@purdue.edu](mailto:jonesp@purdue.edu)



# AgrAbility: USDA–sponsored program that assists farmers, ranchers, and other agricultural workers with disabilities.

- Partners land–grant universities with disability services organizations. Currently 20 state projects
- National AgrAbility Project: Led by Purdue’s Breaking New Ground Resource Center. Partners include:
  - Goodwill of the Finger Lakes
  - APRIL (Association of Programs for Rural Independent Living)
  - Colorado State University
  - Washington State University
- More information available at [www.agrability.org](http://www.agrability.org)



# Low-Tech Assistive Technology for Farmers Worldwide

Ned Stoller, ATP  
National AgrAbility Project  
Purdue University

*“One billion, or 15% of the world’s population, experience some form of disability. Persons with disabilities, on average as a group, are more likely to experience adverse socioeconomic outcomes than persons without disabilities.”*

World Bank

*“The majority of the world’s 650 million disabled people live in developing countries; 80 percent of them in rural areas, often in a state of dire poverty.”*

FAO

# AgrAbility Mission

The vision of AgrAbility is to enhance quality of life for farmers, ranchers, and other agricultural workers with disabilities.

Through education and assistance, AgrAbility helps to eliminate (or at least minimize) obstacles that block success in production agriculture or agriculture-related occupations.





# The Manifest Need for Assistive Technology in Rural Areas



## Kenyan innovator converting trash into electric wheelchairs

What started out as a hobby turned into a passion and is now a business for Lincoln Wamae. He makes custom electric chairs using scrap materials he collects from junkyards.

The self-taught innovator plans to one day mass produce his designs and sell them all over Africa.

*Video Journalist: Njoroge Muigai*

🕒 02 Sep 2019

[f](#) [🗨️](#) [🐦](#) [✉️](#) [Share](#)

<https://www.bbc.com/news/av/world-africa-49528426/kenyan-innovator-converting-trash-into-electric-wheelchairs>

# The Manifest Need for Assistive Technology in Rural Areas



# High-Tech Assistive Technology



Complex, specialized components, much training needed, costly to purchase and maintain.



# What is Low-Tech Assistive Technology?

Low-tech Assistive Technology has readily **available** parts, **simple** to use with minimal training, **inexpensive** to create, and is **practical** for many farm tasks.



Roll over image to zoom in



Ternence Flynn Fruit Picker Harvester Basket,with Cushion to Prevent Bruising (Pole not Included) Strong Steel Forceps Grasp Fruits

by Ternence Flynn

Price: **\$13.29** & **FREE Shipping**

**Coupon**  Save an extra \$1.00 when you apply this coupon.  
Details

Color: **Red**

- **EASY PICKIN'S** - Easily reach and harvest luscious fresh fruit! This incredible fruit picking tool is specially designed with finger-like prongs to reach gently over fruit to pull apples, peaches, and more clean off the branch.
- **GENTLE PROTECTION** - A deep vinyl coated basket with foam cushion catches and protects the fruit at it falls so the delicate meat and skin won't be bruised.
- **STRONG STEEL** Forceps Grasp Fruits - Easy to use, you can pick fruits without climbing ladders, picking fruits is convenient and practical.
- **POLE CLAMP INCLUDED**- Fruit picker basket attaches easily and securely onto most any pole using the included adjustable clamp.
- **EXTENSIVE USE** -Applicable to home gardening, orchards, parks, farms, gardens, etc.

<https://www.amazon.com/Ohuhu-Light-Weight-Aluminum-Telescoping-Equipment/dp/B0171HVXG0>

# Why is Low-Tech Assistive Technology Important?



These concepts can be created with readily available local materials anywhere in the world, from Cambodia to Canada.



# Kneeler and Seat: mobility



The Folding Garden Kneeler and Seat, which consists of tubular-steel frame and handles plus covered foam padding, functions as both kneeling bench and work seat. When used as a kneeler, the padding protects one's knees while the handles serve as arm supports when attempting to get back up. Flipped over, it becomes a seat designed to be high enough for one to stand up and sit down on but low enough to be at the proper height for many gardening tasks. The handles usually fold down for portability and storage. Amazon item B07TWD6DMP.

<http://www.agrability.org/toolbox/?solution=123>

# Kneeler and Seat: mobility



Kneeler seat and back support fabricated from steel rebar, widely available material around the world. It is 23-inches wide, 19-inches tall, and 10-inches deep. The kneeler platform is 4-inches above the ground.

# Poultry Catching Hook: mobility



Workers who cannot move quickly can catch poultry without running. The Poultry Catching Hook is a single piece of heavy-gauge steel wire about 48 inches long with a handle at one end and a hook at the other that's used to capture a bird by snagging one of its legs. Unlike the older wooden types, the newer wire ones won't splinter or break.

<http://www.agrability.org/toolbox/?solution=1426>



# Pole Mounted Fruit Picker: mobility



Workers who cannot climb can pick fruit from the ground. The Pole-Mounted Fruit Picker is a wire basket at the end of an 8-foot pole, with wire fingers protruding out from the top of the basket. The fingers hook around the fruit and pull it into the basket, which the user then lowers to the ground and empties.

<http://www.agrability.org/toolbox/?solution=10>

# Pole Mounted Fruit Picker: mobility

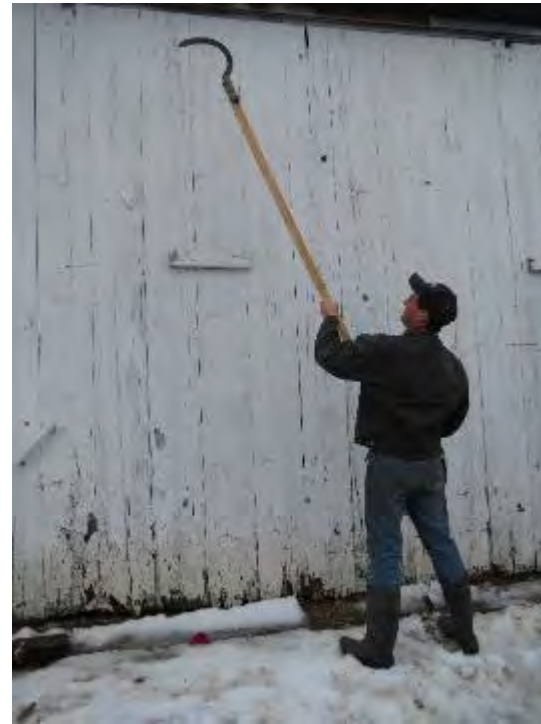


Any type of small basket or pail mounted to the end of a pole will catch falling fruit. A blade for cutting stems or prongs for plucking fruit from the branch can be fastened with nails, screws, or straps.

# Pole Mounted Sickle: mobility



This sickle is fastened to a pole with these strips of scrap steel. Pruning trees can be done without climbing ladders.



# Walker Cart: mobility & carrying



A Walker Cart enables workers to carry loads around the farm and lean on the cart for balance at the same time. This walker cart can also be modified with a lowered seat cushion on the cart to sit and 'pull' along as needed. Produce, plants and small loads of other materials are often picked up and moved. Carrying such loads is impossible to do with poor balance. These materials can be loaded onto the cart and then pushed to the destination with much less effort than carrying.

<https://www.amazon.com/dp/Boo87oEJJS>

# Walker Cart: mobility & carrying



This walker cart is built from scrap bicycle parts and rebar. A 10-foot-long section of rebar was bent into a rectangle 20 x 40-inches. Rebar rods were welded across the make a rack. The rebar rack was welded onto the front yokes of two bicycles to make it into a cart. The front wheel with handlebars from another bicycle was welded to one end of the cart to provide steering and handles to lean on while moving the cart. This helps people with back and mobility impairments to lift and carry loads around the farmland and to market.

# Low-profile Harvest Cart: mobility



Vegetable harvest carts allow workers to plant, weed and harvest low-profile vegetable crops from a sitting position. Growing flowers, strawberries, green beans, peppers, asparagus and many others require the farmers to move along rows stooped over or on hands and knees. Working in such positions all day long is both painful and unhealthy. The cart seats are low to the ground so the worker can comfortably reach the fruits or vegetables.

<https://www.csacoalition.org/wp-content/media/uploads/Plans-for-a-specialized-harvest-cart.pdf>

# Low-profile Harvest Cart: mobility



Scrap wheels cut from bicycles welded to a steel rebar frame. The platform is 22-inches wide and 42-inches long. The platform is suspended 3-inches above the ground and balances between the two wheels. The foot end of the platform lightly drags on the ground. The low platform is convenient to slide on and off from ground level.



# Walk-in Feeder: mobility



Sully, IA, hog farmer Arvin DeCook designed and installed a Ground-Level Pen Walk-In Feeder so he cannot be knocked over by hungry livestock. It extends from the pen fence into the pen and is wide enough to enter with feed buckets. Fences on both sides of the feeder are gapped such that hogs can get to the feed but not into the feeder. The end of the feeder is blocked off with hog panels.

<http://www.agrability.org/toolbox/?solution=233>



# Beehive Deck: Mobility & Back Pain

A raised deck around beehives elevates workers to reach tall hives without straining their arms, or to stand at ground level to reach low hives without bending their back.



# Step Stool: mobility



This step stool with grab handle is constructed of welded steel rebar. It is 15-inches long, 10-inches wide, and 10-inches tall. It helps farm workers with leg impairments climbing up to reach items on a high shelf, or climbing up steps on equipment.

# Rear-view Mirror: neck injury



This extension mirror is constructed of a welded steel rebar frame and a mirror from a scrap Ford van. Ford vans have very good mirrors for this. The extension is 15-inches long and can be clamped or bolted onto tractor fenders or frame. The mirror helps workers with neck injuries see behind the tractor.

# Hand Bike: mobility between fields

Hand-pedal bikes are often used for mobility instead of wheelchairs for long-distances.



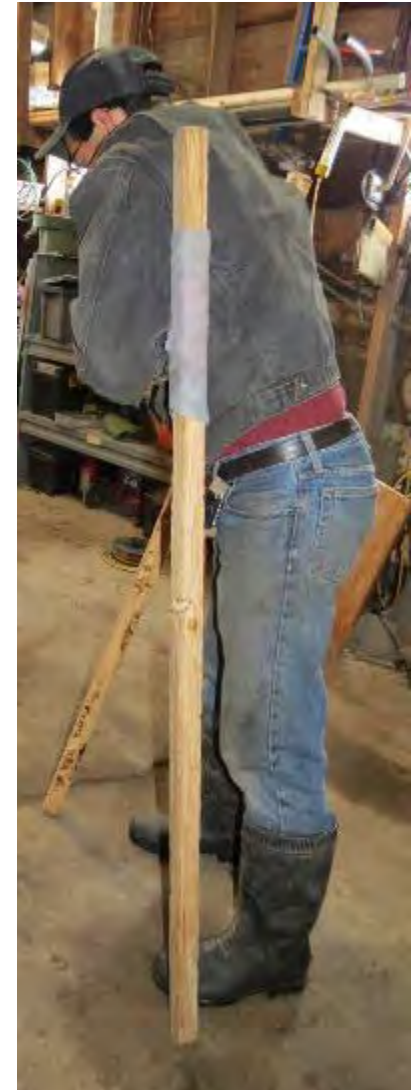
# Walking Stick: balance in the field

A walking stick can be used to lean on while working in the field with two arms. This helps her maintain balance.



# Torso support: balance while working with 2 hands

A fabric strap fastened between two walking sticks gives stability to a worker who cannot maintain balance. It also serves as crutches when walking by leaning on the strap.



# Rope Guide: low vision

To navigate to specific sites in his yard, Decatur, IL, farmer Robert Miller (who is blind) uses a Rope Guide, which was first installed so that he could locate his wood-pile in order to bring wood into the house during winter. The Guide consists of steel posts driven into the ground about every 10 feet, with a nylon rope stretched between them. Finding the first stake when he comes out the door, Miller follows the rope line to the woodpile and back again. This guidance concept could also be used to walk to the mailbox, garden, picnic area, or any other location in the yard.



<http://www.agrability.org/toolbox/?solution=295>

# Wind Chimes: low vision

Seymour, WI, farmer Chuck Gomm has placed Wind Chimes with differing sounds on various buildings as non-visual navigation points. The chimes provide an easy way to identify the buildings as he walks about his farmstead. This is especially helpful in winter, when the snow tends to muffle natural sounds and terrain cues.



<http://www.agrability.org/toolbox/?solution=296>



# Leaning Stool - balance

A leaning stool helps workers balance while using 2-handed tools. It is portable and easily moves with the workers. They walk to the work area, then rest on the stool while doing the job task.



Roll over image to zoom in

Focal Safco Products Mogo Seat, Leaning Stool, Portable, Indoor/Outdoor Use (Available in Two colors)

by Focal

★★★★☆ 172 customer reviews | 55 answered questions

Price: **\$84.24** & **FREE Shipping**. [Details](#)

Color: **Black**



- NA
- Imported
- **LEANING POSTURE.** Focal Mogo Seat supports a leaning posture which may provide less pressure on your spine when compared to standing and help engage major muscle groups.
- **MOBILE CONVENIENCE.** Collapsible, compact and portable design can be used anywhere a seat is needed – indoors and out – for a truly versatile seating solution.
- **RANGE OF MOTION.** Pivoting seat inspires dynamic movement to help keep you active throughout the workday. The minimalist design encourages you to use core muscles to support a better posture versus traditional seating options.
- **INDOOR/OUTDOOR USE.** Seat includes a reversible foot: One side is soft rubber for use on non-slip, indoor flooring and the other is reinforced-fiberglass for grass, dirt and other outdoor surfaces.
- **EASY HEIGHT ADJUSTMENT.** Seat features multiple notches for easy height adjustments and accommodates user heights between 4' 11" to 6' 8".

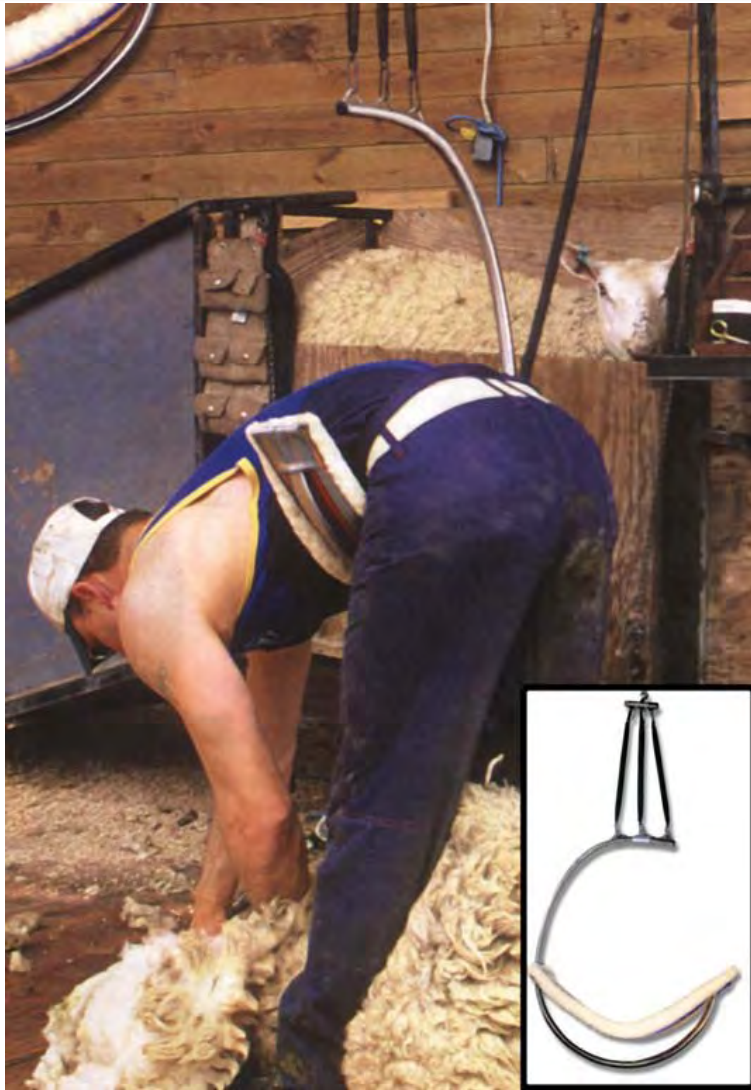
<https://www.amazon.com/Products-Leaning-Portable-Outdoor-Available/dp/B01l2N71Z8>

# Crutch Seat: mobility



One end of a fabric strap is sewed onto a crutch, and the other end sewed onto a hook. When ready to sit down for a rest, the strap is hooked across the two crutches to form a seat. When walking, the strap is hooked to one crutch. The 18-inch long strap is 3-inches wide and made of scrap denim from old clothing.

# Back Support Frame: back pain



A Crutching Frame with Chest Belt can help reduce back fatigue while shearing sheep. The device is a steel loop with a padded chest belt across the bottom on which the shearer rests his upper body while bending over to shear sheep. The frame hangs from a beam by spring-loaded cables, which balance the weight of the shearer to take the pressure off his/her back.

<http://www.agrability.org/toolbox/?solution=271>

# Back Support Frame: back pain



This back-support frame is a strap of cloth fastened between two wooden poles. The strap is 18-inches long and 4-inches wide. It supports the upper body and takes the pressure off the lower back when reaching forward in a kneeling or stooped position.



# Tool Balancer: arm & grip strength



A tool balancer holds the weight of a tool for a worker with back and arm impairments. The worker can move the tool easily without the burden of holding it up. A tree branch can serve as a readily available tool balancer when the task can be positioned in an appropriate place.

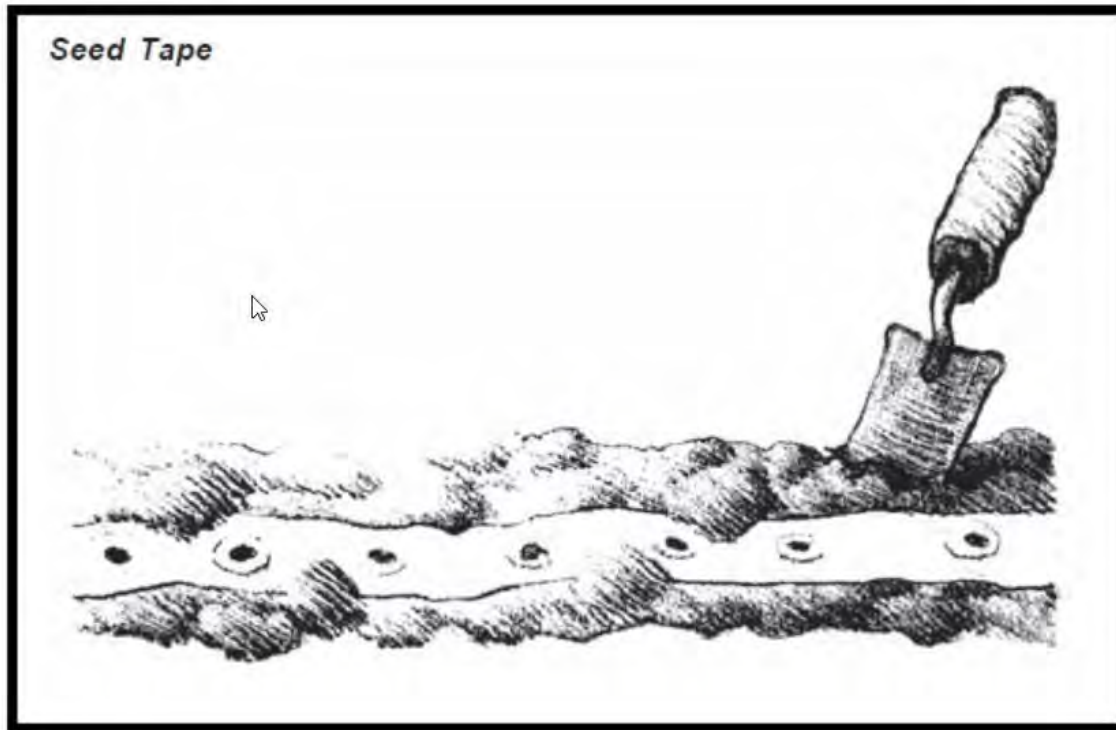
# Two-person lifting straps: back pain



The Two-Person Potlifter is a two-handed 'tool' with straps that slip and automatically cinch around a large flower pot or other heavy object-e.g., rock, tree root ball, log, cement bag, hay bale-so it can be moved easily and in an ergonomically safe manner. The device can pick up most anything between 12 and 27 inches in diameter and weighing up to 200 pounds. (Also available is its 'big brother,' the four-person Prolifter, which can lift and move items measuring up to 34 inches in diameter and weighing 400 pounds.)

<http://www.agrability.org/toolbox/?solution=1525>

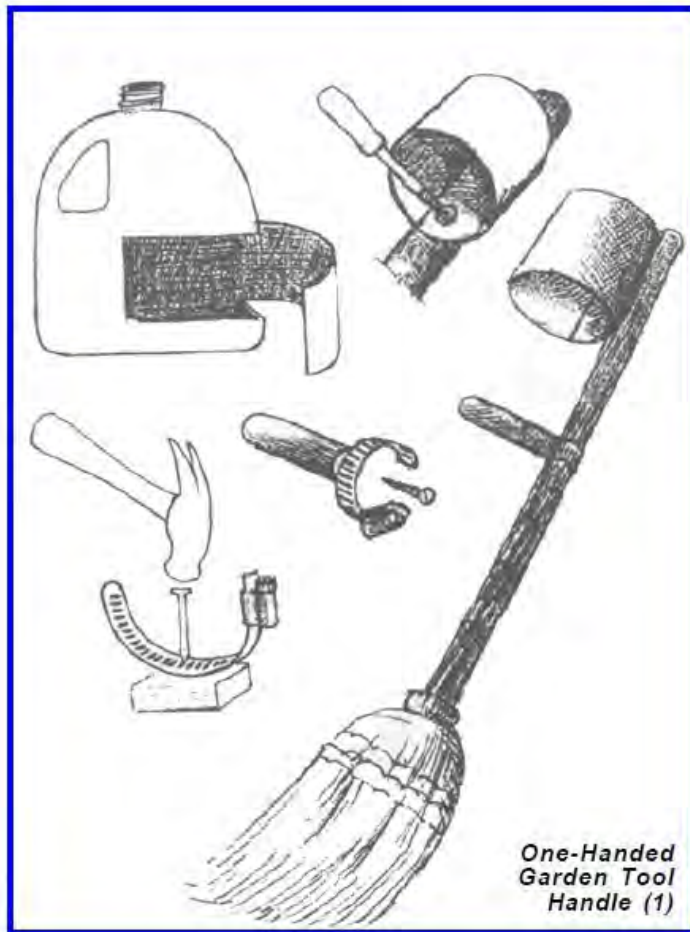
# Seed Tape: low vision



<http://www.agrability.org/toolbox/?solution=104>

Seed Tapes allow one to do the fine planting work (i.e., seed placement) indoors at a convenient and comfortable work site. The tapes are made by cutting newspaper into 1-inch-wide strips, brushing them with flour-and-water paste, placing the seeds on them at appropriate intervals, then allowing them to dry. When planting time arrives, the strips are laid in the furrows, covered, and watered just like seeds would typically be planted.

# One-hand Long-Handle Tool Grip: arm & grip strength



Doreen Greenstein's book, *Easy Things to Make Things Easy*, describes/shows a One-Handed Garden Tool Handle, constructed using a 2-liter plastic soda bottle and a hose clamp. To make the hand grip, cut 5 inches off the handle end, screw the hose clamp to the cut end of the 5-inch piece, then tighten the clamp onto the handle at the appropriate location for a handhold. To make the handle's arm saddle, cut a band of plastic from the soda bottle, and screw it onto the top of the remaining tool handle. Another way to accomplish the same thing is to fasten the end of a forearm crutch onto the end of a shortened tool handle.

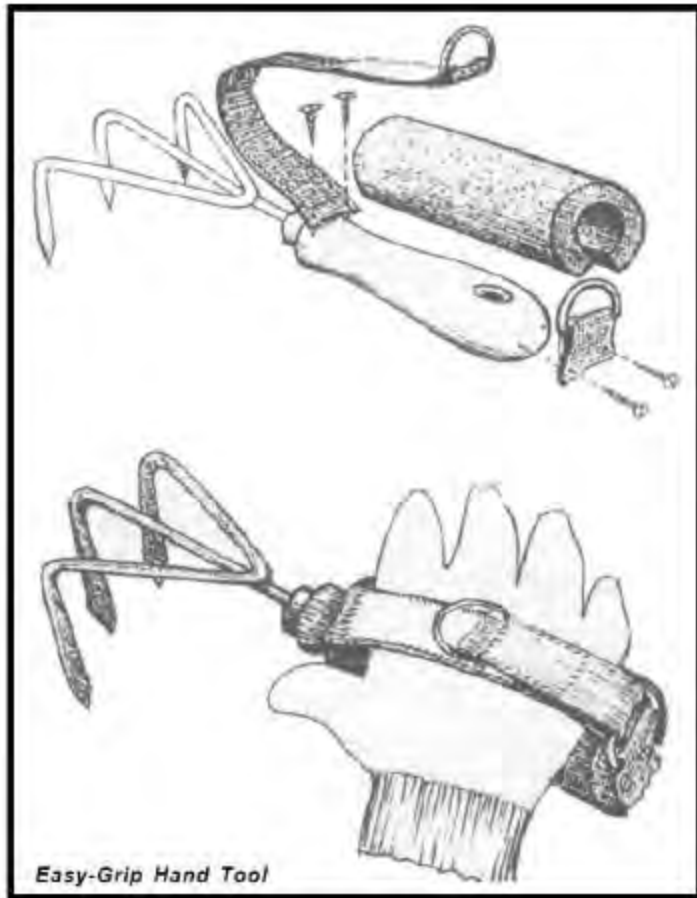


# Single Arm Tool Forearm Cuff

A farmer with one arm can hold and control long-handle tools with a cuff around his forearm. The end of the tool handle is inserted into a fabric cuff so it is supported by the worker's arm. Without a cuff, the hand and wrist must hold the full weight of the tool and control its motion, causing fatigue and pain. The cuff can be made with a fabric sleeve or straps.



# Easy-grip Hand Tool: grip strength



Doreen Greenstein's book, *Easy Things to Make Things Easy*, shows how to make an Easy-Grip Hand Tool using a "D" ring, Velcro strap, and hot water pipe insulation. One end of the Velcro strap is fastened to the top end of the tool handle; the "D" ring is fastened to the opposite end of the tool handle; and the foam pipe insulation is then wrapped around the handle. A person's hand can be strapped onto the thickened handle by passing the Velcro strap through the "D" ring and doubling back onto itself. Large diameter handles are easier to hold for workers with hand injuries.

# Fabric Gripping Aid: grip strength



Intended for those with limited hand/finger strength or control, or those with partial hand amputations, the Active-Hands Gripping Aid is designed to allow one to use numerous items that require a strong grip in order to properly utilize (e.g., shop tools, garden tools, equipment levers, kitchenware, handlebars). The product, made of padded neoprene plus wide Velcro strap, is designed such that the user can to put it on independently. Fabric strips wrapped around the hand and wrist could also serve this purpose holding the hand in a fist.

<http://www.agrability.org/toolbox/?solution=1575>

# Fabric Gripping Aid: grip strength



Webbing wrapped around the hand and wrist hold a fist.

# Handle Cushion: grip strength



Small-diameter handles are especially difficult to hold securely when a person has hand injury or disease. Increasing the diameter of a tool handle and making it soft allows the worker to hold it tightly with less grip force of the hand. Fabric strips, foam padding or any other cushion material can be wrapped around small tool handles. Hand tools used with high-force should have 1  $\frac{3}{4}$ " diameter handles for maximum grip strength.

# Handle Cushion: grip strength



# Wrist Cuff with Hooks



Farmers with weakened hands can use a wrist cuff with hooks to lift baskets and pails. The hook transfers the load to the wrist instead of fingers. This could be made of fabric with metal or wood hooks sewed or tied on. If there was a sling from around the shoulders to the cuff it would transfer some of the load off the wrists.

[amazon.com/dp/B07921M7YC](https://www.amazon.com/dp/B07921M7YC)

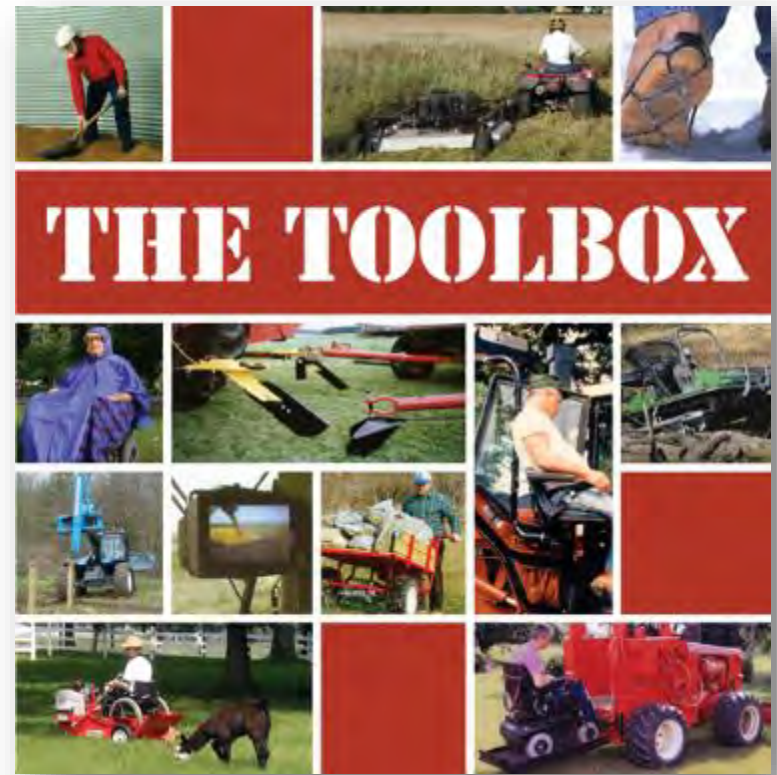
# Wrist Cuff with Hooks





# The Toolbox Assistive Technology Database

- Print, CD, and web versions  
[www.agrability.org/Toolbox](http://www.agrability.org/Toolbox)
- More than 1500 products to help farmers and ranchers with disabilities

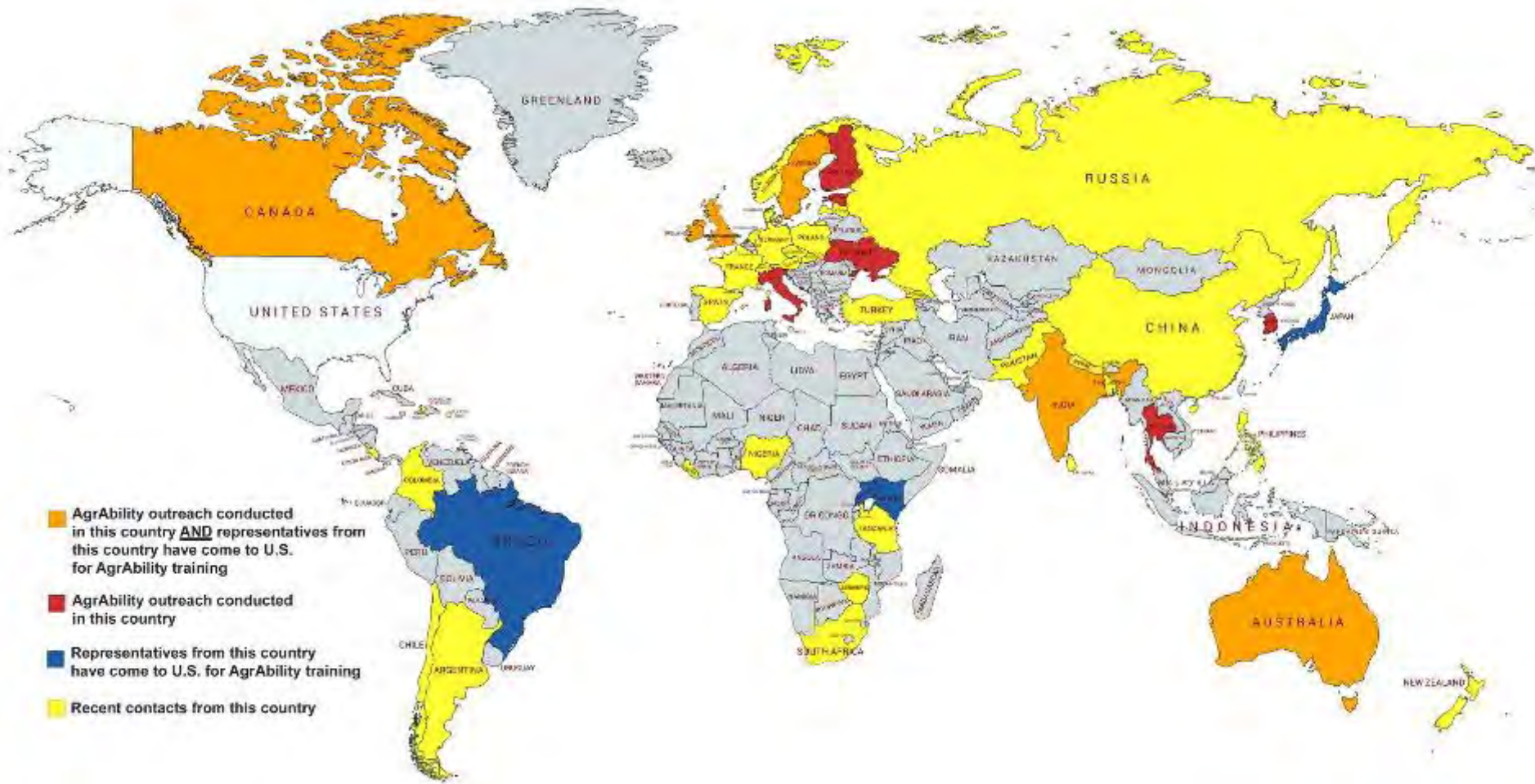


# International AgrAbility Network

NGO's, Projects, and Missions with interest in agriculture and assistive technology

- Free Wheelchair Mission
- Engineers Without Borders
- ECHO International
- International Food Organization
- World Health Organization
- World Food Prize
- Mobility Worldwide
- Wheelchair Foundation
- Wheels for the World
- LeTourneau University Global Initiatives
- Purdue Utility Project

# International AgrAbility Network



**Join the International AgrAbility  
Network to learn and share your  
ideas!**

**Email [agrability@agrability.org](mailto:agrability@agrability.org)  
with subject 'international'**

**Questions and Discussion**