



## Assistive Technologies for Lower Extremity Mobility on the Farm

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### AgrAbility Virginia

AgrAbility Virginia promotes safety, wellness, and accessibility on the farm through education, rehabilitative services, and assistive technology. AgrAbility Virginia offers services to farmers at no cost, supports a wide diversity of farmers and farmworkers across all farming communities, and address a wide variety of disabling conditions in agriculture. Recommending assistive technologies for increased access and mobility is one way that AgrAbility Virginia supports farmers. To learn more, you can visit our website by going to [www.agrabilityvirginia.org](http://www.agrabilityvirginia.org).

### Arthritis and Lower Extremity Accessibility on the Farm

Arthritis, in particular osteoarthritis, can lead to pain, swelling, and loss of function in the joints that may impact the extremities as well as the spine. This fact sheet provides examples of assistive devices for farmers with arthritis in the lower extremities in an effort to optimize their farming experience and enhance their quality of life on the farm. Additionally, this fact sheet will be inclusive for farmers who seek greater lower extremity mobility but do not have arthritis. For example, solutions have been allocated for farmers who do not walk or require intermittent to full-time wheelchair use to meet their mobility related activities on the farm.

### Assistive Technologies

Assistive technologies are used to improve accessibility and enhance independence. Recommending assistive technology is one way that AgrAbility Virginia supports farmers. Our recommendations can include a lift for a tractor or an added handrail or step to improve access, or a small modification on an existing tool such as adding a horizontal handle to a shovel for better grip strength. Assistive technologies can be highly technological like a robotic glove to help with grip strength or 'low tech' like the sit-and-weed stool listed below.

The assistive technologies included in this guide are meant to aid people with lower extremity mobility challenges.\* They are readily accessible by ordering online. A quick online search will lead you to an array of manufacturers for most of the items listed on the following pages. The examples below are only a starting point. The AgrAbility Virginia program is eager to discuss these and other options in depth to see if they are right for you.

### Tractor Operator Station Access

#### Add On Tractor Steps

Add on tractor step (like that pictured in Figure 1 (Tractorseats.com, n.d.)) can be attached to the tractor to assist in access to the operator station by

decreasing the step length and width that may reduce bone on bone contact in lower extremities with osteoarthritis. Additional benefits include: a handrail to shift forces to the upper extremities, easy installation, accommodates older tractors, and an option for a fourth step.



Figure 1 Add On Tractor Steps (Tractorseats.com)

### Tractor Lift

A tractor lift (like that pictured in Figure 2 (Coach Lift, n.d.)) can enhance cab access by lifting a person from the ground to the level of the operator station of a tractor or combine. These lifts offer options to sit in a chair or stand on a platform, depending on user ability. A button operated by the user raises and lowers the chair or platform. Additional benefits include: customizable heights, modifications for heavier persons, and adaptations for the chair to accommodate for different needs.



Figure 2 Tractor Lift (Coach Lift)

## Utility Vehicles (UTVs)

### Side-by-Side UTV

A side-by-side is a two-seater utility vehicle (Figure 3 (John Deere, n.d.)) that can be used to reduce joint pain, time, and energy expended walking around and working on the farm. The side-by-side may also be used to increase mobility around the farm for farmers who are non-ambulatory or primarily utilize wheelchairs for their mobility related needs. Function required to operate a side-by-side UTV includes upper extremity grip strength and range of motion to navigate steering wheel, knee and hip range of motion for seating, and ankle/knee range of motion and strength for the gas pedal—though foot pedals can be adapted for hand controls if need be. Additional benefits include: the ability to add attachments suited for your farming needs, easy to use, anterior chest straps for trunk/postural stability, and a sun shade.



Figure 3 Side-by-side UTV (John Deere)

### UTV Hitch Step

A UTV hitch step (Figure 5 (Great Day, Inc., n.d.)) allows for better step up and walk in access to the bed of a UTV that sits at a challenging height for farmers with arthritis. The hitch step reduces the height of the step, in order to access the bed of the UTV without having to increase the amount of bone-on-bone contact in the affected extremity. Additional benefits include: the ability to fold under the bed of the UTV, 300lb weight limit, and slip-resistant ridge.





Figure 4 UTV Hitch Step (Great Day, Inc.)

### ATV/UTV Big Bale Movers

A two wheeled ATV/UTV big bale mover (Figure 5 (AgrAbility, 2017)) can load, transport, and unload large bales of hay without having to leave the driver's seat thereby reducing the forces of manual labor on our lower extremities. The big bale movers will allow individuals who require wheelchair or power mobility to meet their mobility-related needs the opportunity to stay in in the driver's seat while accomplishing their task on the farm. Additional benefits include: electric powered, can attach to compact tractors, accommodate various sizes of bale from 1,100-2,000lbs, and a 3-point hitch accessory is available.



Figure 5 ATV Big Bale Mover (AgrAbility)

### ATV/UTV Strong Arm Lift

This attachment (Figure 6 (AgrAbility, 2018)) is designed to pick up items without having to leave the ATV seat, reducing forces on your lower body and increasing accessibility on the farm for farmers who are non-ambulatory or need wheelchairs for assistance. It uses a hydraulic system that runs off the 12-volt battery of the ATV to lift/dump up to 250 pounds. Additional benefits include:

affordability, easy to install, and that you can tuck it against the bed of the ATV when not in use.



Figure 6 ATV/UTV Strong Arm Lift (AgrAbility)

## Automated Opening Gates & Hitching Systems

### Drive-through Electrified Gate

An electric gate (Figure 7 (Koehn Marketing, Inc., n.d.)) would eliminate the need to get out of your truck or tractor to open and close gates on the farm. To open the gate, you nudge the horizontal arms with your vehicle, and it automatically closes behind you as you drive through the gate. This would eliminate the bone-on-bone forces that occur when you get in and out of your vehicle and permit individuals who are non-ambulatory to open/close the gate without having to leave the tractor or truck. Additional benefits include: affordable, easy to install, can attach to existing electric fences.



Figure 7 Drive-through Electrified Gate (Koehn Marketing, Inc.)

## Automatic Gate Opener

Similar to the drive-through electrified gate, an automatic gate opener (Figure 8 (Ghost Controls, n.d.)) allows the user to open and close a gate without getting on and off the tractor or in and out of the truck. An automatic gate opener operates with a remote control that the user keeps in their tractor or truck and the gate opens and closes at the touch of a button. Additional benefits include: does not require an electricity hook-up to operate (can run off of solar).



Figure 8 Automatic Gate Opener (Ghost Controls)

## Agri-Speed Hitch

Automatic tractor hitching systems, such as the Agri-Speed Hitch (Figure 9 (Agri-Speed Hitch, n.d.)), eliminate the need to get out of your tractor to hitch your trailer or machinery. By being able to remain in your tractor during hitching and not having to use the steps repeatedly, you can reduce the pain caused by bone-on-bone contact. This also allows farmers who are non-ambulatory or wheelchair dependent to complete their mobility related activities on the farm from a sedentary position. Additional benefits include easy installation, accommodates older tractors, customizable, affordable.



Figure 9 Agri-Speed Hitch (Agri-Speed Hitch)

## Stools

### Sit & Weed Stool/Garden Scooter

A sit and weed stool or garden scooter (Figure 10 (Gardener's Supply Company, n.d.)) would help eliminate the increased forces on the legs and hips that are associated with bending over and kneeling down to pick crops. By offloading the joints in a seated position, the effects of the osteoarthritis should be greatly reduced. Additional benefits include: affordable, adjustable-height, swivel seat, large tires suitable for rough terrain, and a 300-pound capacity.



Figure 10 Garden Scooter (Gardener's Supply Company)

### Garden Rocker

Similar to a sit and weed stool or garden scooter, the garden rocker (Figure 11, Gardener's Edge, n.d.) allows the user to reduce strain on the legs and hips by offloading the joints in a seated position. This allows for greater endurance and comfort while working in the garden. Additional benefits include:



affordable, lightweight, height adjustable, optional cushion, a 220-pound capacity.



Figure 11 Garden Rocker (Gardener's Edge)

### Garden Kneeler

This item (Figure 12 (Gardener's Supply Company, n.d.)) allows the user to kneel or sit comfortably while doing gardening tasks reducing strain on the lower extremities. Oriented one way, the kneeler is at seat-height, when flipped upside down, the kneeler offers an elevated pad for kneeling. The side handles also assist the user in getting up from the kneeling position. Additional benefits: lightweight, folds for easy storage, a 250-pound capacity.



Figure 12 Garden Kneeler (Gardener's Supply Company)

## Conclusion

The assistive technologies included in this publication are just a few examples of assistive technologies that could be useful for farmers who

are seeking safer and more accessible lower extremity mobility options.

The National AgrAbility Toolbox offers hundreds of examples of assistive technologies for farmers, gardeners, ranchers, and agricultural workers with physical disabilities. Organized by category, this resource contains real-life examples from farmers across the country and showcases products and adaptations that farmers, gardeners, ranchers, and agricultural workers have used to overcome physical challenges. **Visit the National AgrAbility Toolbox here:** <http://www.agrability.org/toolbox/>

Additionally, the AgrAbility Virginia website highlights the work of AgrAbility Virginia, with success stories, information about the team, and resources that the team has developed for farmers, ranchers, gardeners, and agricultural workers. **Visit the AgrAbility Virginia website here:** <https://agrability.alce.vt.edu/>

## References

- AgrAbility. (2018, Jul 19). *Strong Arm Lift*. National AgrAbility Toolbox. <http://www.agrability.org/Toolbox/?solution=1700>
- AgrAbility. (2017, Mar 17). *ATV/UTV Big Bale Movers*. National AgrAbility Toolbox. <http://www.agrability.org/Toolbox/?solution=1546>
- Agri-Speed Hitch. (n.d.). *Hitch Information*. Agri-Speed Hitch. <https://www.bergmanmfg.com/info.html>
- Coach Lift. (n.d.). *Tractor and Combine Lift*. Coach Lift. <https://www.coachlift.com/farm-lift.html>
- Gardener's Edge. (n.d.). *Vertex Garden Rocker Original Comfort Seat*. A.M. Leonard's. <https://www.gardenersedge.com/garden-rocker-original-comfort-seat/p/GB1200-GN>
- Gardener's Supply Company. (n.d.). *Deep Seat Garden Kneeler*. Gardener's Supply Company. <https://www.gardeners.com/buy/deep-seat-garden-kneeler/40-009.html>
- Gardener's Supply Company. (n.d.). *Deluxe Tractor Scoot with Bucket Basket*. Gardener's Supply

Company. <https://www.gardeners.com/buy/deluxe-tractor-garden-scoot/40-131.html>

Ghost Controls. (n.d.) *TSSIXP Solar Heavy Duty Single Automatic Gate Opener Kit*. Ghost Controls. <https://ghostcontrols.com/products/tss1xp-kit>

Great Day, Inc. (n.d.). *UTV Hitch Step*. Great Day, Inc. <https://greatdayinc.com/products/utv-accessories-2/hitch-step-utv/>

John Deere. (n.d.) *XUV835E*. John Deere. <https://www.deere.com/en/gator-utility-vehicles/full-size-crossover-gators/xuv835e-utility-vehicle-2021/>

Koehn Marketing, Inc. (n.d.). *Drive Through Electric Gates*. Koehn Marketing, Inc. [https://www.koehnmarketing.com/index.php?route=product/product&product\\_id=77](https://www.koehnmarketing.com/index.php?route=product/product&product_id=77)

Tractorseats.com. (n.d.). *John Deere 7000-7010 Series Step & Handrail*. Tractorseats.com. <https://www.tractorseats.com/p-3350-john-deere-7000-7010-series-step-handrail.aspx>

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