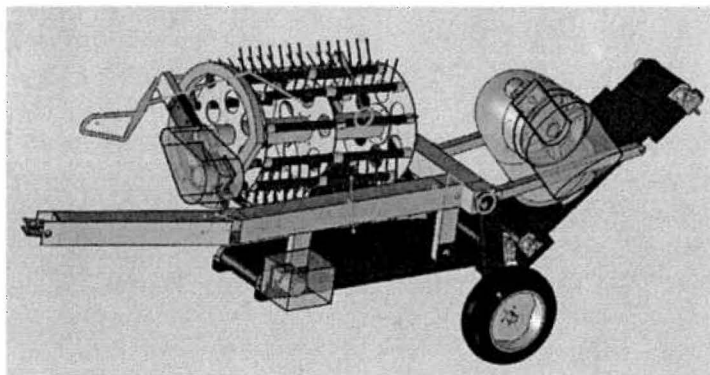


2) PROBLEM/SOLUTION. Describe the problem you hope to solve with your project. Explain why solving this problem is important to your farm/ranch and to other farmers/ranchers in your area and the North Central Region. Provide a detailed description of the innovative research, demonstration, or education project you propose. Describe the sustainable agriculture solutions you will test to solve the problem. Focus on the piece of the project you can reasonably complete during the time period of the grant (2 years).

Most edamame in the United States is imported for the frozen food market. Local US production for the fresh food market is growing, but is limited by harvest methods. Edamame can be harvested with a mechanical green bean picker, but commercially available bean pickers are not economically viable for use on small farms. A used Oxbo pull-type bean picker can cost \$20,000 and is approximately 16 feet long, making it too large and cumbersome to use on a small farm, as well as too expensive. Picking edamame and bush type green beans by hand is very laborious, not cost effective and not sustainable. Although demand is high and prices can be fairly good for edamame (\$8/lb at farmer's markets), the selling price does not support the cost of harvest labor. This is unfortunate because edamame is very popular amongst children and an excellent healthy substitute for snack foods, such as chips. Making edamame and bean production more feasible and productive for small growers will help raise farm incomes, keep small farmers in business, produce locally available vegetables and provide healthy foods to consumers.

To provide the ability to mechanically harvest edamame and bush beans, Ethan Marshall designed a new bean picker for small farmers. The design is compact, relatively easy to build and easy to operate (diagram below). The cost of materials for the bean picker is \$6915. Because this is a prototype, costs are



expected to be higher for this model than subsequent ones because this construction will involve design testing as well as design modifications during construction. Ideally, the cost of a picker will eventually be below \$5000. During this project, we will explore ways to get costs below that level. The picker is approximately 6 feet long (not including tongue) and hydraulically operated. It can be made to be PTO-driven, driven by tractor hydraulics, or driven by its own motor. The reel is designed to finger

through the plants, pulling both the beans and the leaves onto the conveyor belt. The conveyor assembly uses two 12-inch ribbed belts and carries the beans from the reel, under the fan, and finally to sacks or a small wagon pulled behind the harvester. The wheels are adjustable so the user can move the conveyor closer or farther away from the ground. The fan is driven by a hydraulic motor and a belt. The fan's blades are pitched steeply to cause more vacuum at lower speeds and the hydraulic motor allows the user to adjust the fan speed so beans are not lost through the fan and chaff is effectively removed.

For this SARE project, Ethan will build the edamame harvester and Ethan and Mary Ellen will test it on Ethan's farm in 2013 and will do season-long harvest studies with it on Mary Ellen's farm in 2014. Mary Ellen will plant duplicate plots of edamame and harvest half with the mechanical harvester and half by hand for certain harvest dates. The amounts harvested and the profitability will be compared for each harvest method. Even though it is hypothesized that larger amounts can be harvested with the mechanical harvester, it is not known if damaged pods and harvest waste from the mechanical harvester will adversely affect economic gain. In hand harvest, immature pods can be left for later picking, maximizing the yield capacity of each plant. In mechanical harvest, plants are destroyed and all pods are picked in a single pass. Yields may decrease from culling of undesirable pods.

This project will benefit more farmers than just Ethan and Mary Ellen because designs and construction plans will be made available via the internet and extension activities. Because small grower's needs are often overlooked, equipment manufacturers that have been approached have expressed that they will likely not try to produce and market a small scale bean harvester in the future. Equipment is available