NATIONAL SECOND - AGRICULTURAL MACHINERY

Onion Harvester and Motorcycle Operated Salt Turning Device

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Shrawan Kumar (41), a motorcycle mechanic, has developed a number of useful devices to reduce dependence on manual labour, which is getting scarce by day. One of them is an onion harvester, which is a combination of a machine for cutting leaves/topping and a tractor operated digger. He has also developed a motorcycle operated salt turning device for operation in salt farm for a task, which is otherwise done manually.

Having studied till only class ten, Shrawan was earlier engaged in farming, like most members of his community in the region. His father was a mason while mother a housewife. Shrawan got married in 1996 and has a young son. His wife does not have much formal education but understands the requirements of the family well. She has been supporting Shrawan in all his endeavours.

He slowly got disinterested in farming as many operations, especially hoeing and weeding, had to be done manually. He then started undertaking job work for digging tube wells, which he had to leave due to the accidental death of one of his fellow workers. Though by this time, he had worked in this field for about ten years or so. He then joined a workshop as a casual labour and worked for a year. During this period, Shrawan learned most of the work related to machineries including usage of tools and devices like welding machine, lathe machine, fitting and other machining work. In 2010, he started repairing and servicing of motor bikes and bicycles. Later, in 2014, he set up a small workshop for developing agricultural machinery along with his regular work of servicing of motor bikes. As he had to discontinue farming due to lack of machines/ tools, he used the workshop for his research

and development during lean time. First he developed a mechanized weeder and later went on to develop a number of machines like salt turning device, cable pipe installation machine, device for nursery plantation of onion, onion and garlic leaf cutting device and digger among others.

Onion Harvester

The harvester is a set of two machines first for cutting the leaves of onion and then digging and picking them up without causing any damage to the bulbs.

While harvesting onion, separation of the leaf/stalk from the bulbs is a tedious task and involves a lot of manpower. If leaf/stalk is not removed properly the onion fetches less price. Also if the onion is picked up along with the leaves, separation of soil from the onion becomes a difficult job. In order to mechanize the process, Shrawan developed two machines; one for cutting leaves and another for digging, picking up and cleaning soil from the bulbs. Presently, he is trying to combine both the machines together as a unit i.e. as onion leaf cutter cum digger.

Initially for testing, he had developed motorcycle rear mounted leaf cutting device as well as onion digging device (2013). This was able to dig and pick onion along with soil and drop on the field. Having achieved success with the motorcycle, he implemented it in a tractor by developing tractor front mounted digging unit with conveying and collection unit (2013 - 2014).

The leaf cutting machine

This is an attachment to a motorcycle after removing its rear wheel and has two wheels each on the front and rear. Lifting (of leaves) and cutting mechanism have been incorporated on this attachment, powered by the motorcycle. The cutting width of the machine is 4.5 ft (1.3725 m) with the field capacity being 0.2 ha/h (=1.2 beegha/hour) at a speed between 1.5-2 kmph. This process of leaf cutting is followed by digging the bulbs using tractor operated machine.

Tractor operated onion digger

The tractor front mounted PTO operated machine consists of self-designed frame for supporting power transmission system from tractor PTO and cutting blade and conveyor mechanism. The dug onion along with soil travels on the conveyor along the length of tractor where the soil gets separated due to gap between the slats. The gap is optimized

according to normal size of onion. The onion bulbs get collected without damage in the collector box mounted at the rear of the tractor, which needs to be emptied periodically. The cutting width of the digger is 670 inch (1.778 m) and cutting depth is up to 3 inch (0.076 m) at a speed between 1-1.5 kmph. The machine requires a 50 hp tractor along with which, its field capacity is 0.166 ha/h (1 beegha/h) consuming 2 litre per hour fuel. It is to be noted here that 40 labours are required to do the same job in one day and at Rs 300 per labour.

Shrawan also developed different versions of weeders. Initially, he made a single tine manual weeder where used an old rim of the motorcycle and attached the hoeing and weeding attachments to it with a frame. The whole assembly needed to be pushed for hoeing/ weeding, which was cumbersome. In order to increase productivity and reduce the efforts required, he developed a tool bar, which could be attached to a motorcycle by removing the rear wheel and got power from its engine. The weeder is claimed to cover 2.5-3 beegha/h with the attachment cost being Rs 55,000/-. Later he further modified the motorcycle operated weeder into an engine operated weeder.

Shrawan then developed a motorcycle operated salt farming unit. Earlier, while undertaking well digging work he used to visit salt farming areas and see the manual operation of turning saline water used for making salt. The task is very tedious as the worker needs to stand in saline water, which results in skin irritation/ infection. After noticing that motorcycle based weeder, one his relative also reminded him about the problem of the salt farmers, which he himself had seen. He worked on his weeder and modified the weeding attachment to enable it to turn the saline water during salt farming (2013). He claims that machine can do the job of six persons. For covering a plot of 100x100ft it needs only 100 ml of petrol, hence the operational expenses are also less.

Presently, Shrawan is trying to develop a simple device to open tire nuts from vehicles and an onion transplanting device.