Drudgery Reducing Technologies for Major Crops of Andhra Pradesh

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Introduction

Agriculture is the practice of cultivating plants and livestock in order to provide facilities the human beings. In the rise of the sedentary human lifestyle agriculture was the key development. The cultivation of plant and food grains began years ago in order to provide food to the city population. Agriculture is the main need for the people to live in the society. Agriculture is the main source of livelihood; it provides a source for the people to earn. Most of the population in the rural areas is dependent on agriculture as their main source of income. Agriculture contributes significantly to a country's GDP that is the Gross Domestic Production of a country. By the passing of time, there are a number of revolutions that take place in order to improve agriculture throughout the world or a country. If we talk about agriculture, India has witnessed a number of revolutions, that is, the green revolution, yellow revolution, blue revolution, agriculture. Agriculture affects the biodiversity of a country depending upon agricultural activities.

Agriculture is the process of producing food, feed, fiber and many other desired products by the cultivation of certain plants. The practice of agriculture is also known as "farming". The main source of livelihood of 70% population in India is from agriculture. Agricultural technology refers to technology for the production of machines used on a farm to help with farming. Agricultural machineries have been designed for practically every stage of the agricultural process. They include machines for tilling the soil, planting seeds, irrigating the land, cultivating crops, protecting them from pests and weeds, harvesting, threshing grain, livestock feeding and sorting and packaging the products. Technology has played a big role in developing the agricultural industry.

Agriculture is one of the most labour-intensive occupations of unorganized sector. In India 93% of total work forces are employed in unorganized sector, where health and stress are worse. (Ratnam). Heavy workloads, drudgery resulting in stress and poor health in agricultural work usually has been overlooked. In the view of heavy manifold workload of the agricultural workers, making available, simple labour-saving cost-effective technologies for agricultural workers would save millions of workers from drudgery, stress and ill health. These technologies should fulfill the criterion of reduced energy expenditure, stress, workload, time spent, body disorders, fatigue and drudgery and in turn enhance productivity, efficiency, quality of produce, income and satisfaction of the agricultural workers. Accordingly, there is a need to develop technologies appropriate for the farmer's requirement.

Role of improved farm tools and equipments:

- Reduce drudgery
- Increase inputs utilization efficiency
- Ensure timeliness in field operations and reduce turnaround time for next crop
- Increase productivity of man- machine system
- Conserve energy
- Improve quality of work and also quality of produce
- Enhance the quality of life of agricultural workers

Hence many drudgery reducing technologies are being developed to improve the agriculture production and to decrease the drudgery and strain on the farmers. There are so many drudgery reducing technologies developed so it is difficult to present and discuss all of them in one paper. Hence this paper aims to discuss some important techniques used for the major crops grown in Andhra Pradesh. The major crops grown in Andhra Pradesh are rice, groundnut, cotton, sorghum, maize, pigeon pea, maize etc. Out of these the technologies developed for rice, groundnut and cotton along with some multi-crop technologies are discussed below

Seedling and planting equipment

1. **Dibbler-** It is single row manually operated equipment for dibbling bold or medium seeds in row or gap filling into well prepared soil. It is suitable for drilling wheat, field pea, and maize in small plot.

2. **Paddy drum seeder-** The seeder consists of a seed drum, main shaft, ground wheel, floats and handle. Joining smaller ends of frustum of cones makes the seed drum. Nine metering holes of 10mm diameter are provided along the circumference of the drum at both ends for a row-to-row spacing of 200mm. Two floats are provided on either side to prevent the sinkage and facilitate easy pulling of seeder.
3. **Fertilizer broadcaster-** It is hand operated fertilizer broadcaster. It weighs only 3.5 kg. Its tank capacity is 7.5kg and Swath width- 5 m. an area of 1.1hectare can be broadcasted by it in one hour.

Weeding technologies

1. **Single wheel hoe-** It is used for weeding and inter-culture of vegetables and other crops sown in rows. It is a widely accepted weeding tool for weeding and inter-culture in row crops. It is manually operated equipment for weeding and interculture in upland row crops spaced above 240 mm. It consists of wheel frame, V-blade with tyne and handle. Weeds cutting and uprooting are done through push and pull action of the unit.
2. **Double wheel hoe-** It is manually operated equipment for weeding and inter-culture in upland row crops in black soil region. It consists of twin wheels, frame, V-blade with tyne, U clamp, scrapper and handle. Weeds cutting and uprooting are done through push and pull action of the unit
3. **Cono weeder-** The cono weeder is used to remove weeds between the rows of paddy crop efficiently. It is easy to operate, and does not sink in the puddle. The weeder consists of two rotors, float, frame and handle. The rotors are cone frustum in shape, smooth and serrated strips are welded on the surface along its length. The rotors are mounted in tandem in opposite orientation. The float controls working depth and doesn't allow rotor assembly to sink in the puddle. It is operated by pushing action.
4. **Kurpi-** is light in weight hence quickens the weeding activity. The upper portion of the kurpi is broader and sharper, therefore more area can be covered. The slit at the tip of the kurpi helps to remove the deep rooted and bigger weeds easily. Light and convenient handle of the kurpi is comfortable to use and minimizes the stress on the palm. It reduces heart rate, energy expenditure and drudgery farm women from 5-10 percent Specification of technology:

- Weight of the kurpi : 140 gms
- Material Used: Iron with wooden handle
- Length of the Kurpi: Upper part: 19 cm
- Length of the handle: 11 cm

Harvesting and post-harvesting technologies

1. **Groundnut decorticator-** It is a manually operated equipment to separate kernels from groundnut pods. The unit consists of frame, handle, oscillating arm sieve with oblong hole. The pods are feed in batches of 2 kg and crushed in between concave and oscillating arm having cast iron/ nylon shoe to achieve shelling.
2. **Tubular maize Sheller** It is a hand operated tool to shell maize from dehusked cobs. The unit consists of galvanized mild steel pipe with four tapered fins riveted to its inner periphery. The Sheller is held in left hand, a cob held in right hand is inserted into it with forward and backward twist, to achieve the shelling. Octagonal designs are also available.
3. **Hanging type Grain Cleaner-** It is a simple hanging grain cleaner. Around 225 kg of grain can be cleaned per hour as against the conventional cleaning of 25 kg per hour.
4. **Sickles-** Sickle is one of the most common hand tools used for harvesting of the crops, grass and cutting of other vegetative matters. For cutting, the part of the plant to be cut is held in one hand and sickle operated with other hand. Cutting is achieved by imparting translatory and rotary movement to the blade around the point of cut.
5. **Pedal Operated Thresher-** It consists of wire-loop type threshing cylinder, power transmission system, mild steel sheet body and foot pedal. On pressing the pedal the threshing cylinder starts rotating. For continuous rotation of the cylinder, the pedal is lowered and raised repeatedly. For operation, paddy bundle is held in hands and ear head portion of the crop is placed on the rotating cylinder. The wire-loops hit the ear heads and grain get detached from the rest of the crop.
6. **Cot bag-** It has been designed to carry out the cotton-picking activity efficiently. It can be made of any weight bearing cloth. Cot bag has shaped pockets at the front which makes the

bag friendlier and reduces the drudgery while putting cotton in the bag. It wraps uniformly and is evenly distributed over shoulders and waist. Length of the bag is above the knees which make the worker comfortable while walking. It has convenience in emptying the pick bag. It reduces the drudgery of the user and increases their work efficiency.

7. **Motorized paddy thresher-** Paddy thresher consists of threshing cylinder, oscillating box, winnowing and cleaning attachment, feeding chute etc. The body is made of high-quality steel and sheets to withstand maximum wear and tear. The power is transmitted from the prime mover to threshing cylinder though belt and pulleys. The machine runs on 50 Hp power and can be operated with an electric motor. Paddy is fed from the rear and led to the 64-threshing cylinder, where the spikes act upon each straw and separate the husk from the grain. Under the impact of the blower, the straws eject out through the outlet in front while grains heap up on the ground underneath the machine through a slot provided.
8. **Comb stripper for groundnuts:** This tool is made up of iron sheet designed in comb type structure. It has weight of just 200 gms. It is handy, portable, comfortable and convenient to use. It has efficiency of 6-8 kg per over 2-3kg per hour of traditional practice. It is very useful at the end of Kharif season, because the dried groundnut plants are ready for stripping off groundnut pods from the cut plants. The teeth of this comb catch the pods and stripped off from plants root. Groundnut stripper is a tool to strip off the groundnuts quickly and easily thus reducing the MSDs & injuries. This is available in two models: (i) standing and (the single line stripper mounted on a table of elbow height) (ii) sitting (the single line stripper is mounted on a wooden plank of 6 inches height). This equipment has triangular hooks at the top on which the root part of the shrub is to be stroked. The groundnut fits into the hook and get detached from root. The same process is for both the types of tools. The machine will work easily on dry and partly moisten shrubs.
9. **Cotton Stalk puller-** It is a tool which is specially developed to pull the lengthy & hard cotton stalks from land. Stalk puller is composed of two iron flat foots which are designed in such a way that stalk get clamped in between them, one end of foot is pressed by right leg of used pulled out and by stretching the long handle.
10. **Cotton Picking Machine-**
    - Suction used for picking cotton
    - Sealed lead acid battery - 12 V
    - Regular charging of battery required
    - Collection bag of 5kg capacity.

Conclusion

Agriculture is the backbone and main occupation of India. But it is facing many difficulties due to labour shortage, improper use of machines, poorly designed equipment etc. Hence the drudgery reducing technologies are being developed and tested in many research institutes to support the farmers and improve the agriculture production. These technologies are being ergonomically designed so that farmers won't feel any discomfort while using. Rice, Groundnut, Cotton, Maize are the major crops grown in Andhra Pradesh, hence this paper attempts to provide brief overview of these crops related technologies. Although many technologies are being developed, it is not reaching to the farmers. So there is a need to bring awareness, provide knowledge and make the farmers adopt these technologies through trainings, demonstrations etc.

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Technologies & Methodologies Developed/ Tested/ Refined under AICRP on Home Science.

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