

Farm Mechanization in Agriculture

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Agricultural mechanization helps in increasing production, productivity and profitability in agriculture by achieving timeliness in farm operations, bringing precision in metering and placement of inputs, reducing available input losses, increasing utilization efficiency of costly inputs (seed, chemical, fertilizer, irrigation, water etc.), reducing unit cost of produce, enhancing profitability and competitiveness in the cost of operation. It also helps in the conservation of the produce and byproducts from qualitative and quantitative damages; enables value addition and establishment of agro processing enterprises for additional income and employment generation from farm produce. It is one of the important inputs to usher in all round development in the rural India.

Land Preparation Equipment:

Chisel plough

Deep tillage using chisel plough is essential for improving the yield of crop especially under dry farming. Deep tillage shatters compacted sub soil layers and aids in better infiltration and storage of rainwater in the crop root zone. The improved soil structure also results in better development of root system and the yield of crops and their

drought tolerance is also improved. Summer fallow ploughing using chisel plough prepares the field for better uptake of rain water and soil erosion is minimized. Deep tillage requires high draft requirement especially when the soil is dry and in a state most favorable for chiseling. Deep tillage is not practiced in India due to the unsuitability of the existing deep tillage tools for operation with 35-45 hp tractors.

The developed implement has a sturdy but light structure made of 3 mm thick hollow rectangular tubular mild steel sections. The implement is simple in construction and has only three components viz. frame, standard and share. The share has a lift angle of 20 degree, width of 25 mm and a length of 150 mm. The implement is protected by a shear pin which prevents damage from over loading. The implement could be used for deep tillage up to a depth of 40 cm. The coverage of the implement is 0.42 ha/hr when operated at a spacing of 1.5 m between rows.

Irrigation channel former

In garden lands irrigation channels are formed at regular intervals and then beds are formed to the required size for irrigating the crop. This is done by human labour, which consumes more time and cost. To overcome this problem a tractor drawn channel former to form irrigation channels was developed. The channel forming portion consists of two inner blades and two outer blades. At the junction of these two inner blades a cultivator shovel is fixed to penetrate into the soil. The soil collected in 105 cm width is formed as bund of size 35 cm on both the sides of the irrigation furrow formed by the inner blades. When the tractor is operated at 3 to 4 km forward speed and at 5 m intervals, the

area covered varies from 1.2 to 1.5 ha/hr. The field efficiency varies from 70% to 80% depending on the condition of the soil and field size. Cost of the unit is Rs.12, 000 and coverage is 9.0 ha/day, when channels are formed at 5 m interval.

Ridger

Ridges and furrows can be effectively and economically formed using tractor drawn ridger and planting of seedlings or sowing of seeds can be done in the formed ridges. The cost of the unit is Rs.30,000. The salient features of the unit are forms the ridges and furrows; row to row and plant to plant spacing is adjustable; suitable for sowing in single row or paired rows; an area of 3.5 ha can be covered per day; results in 24 and 90 per cent saving in cost and time when compared with conventional method.

Rotovator

Rotary tiller is connected to the tractor at the three pint linkage of the tractor. The PTO shaft is connected to the gear box input shaft of the tiller using the carden shaft. Tractor with tiller is to be taken to one end of the field. Tiller is lowered using hydraulic control lever up to required depth of operation with properly adjusting the depth control brackets. PTO shaft is engaged to connect rotary drive to the tiller. When tractor is moved forward soil is tilled due to rotary motion of the tiller. Rotovator is used as a secondary tillage and interculture implement in orchard and plantation crops. Rotovator are also available for mini tractor with varying blades.

Sowing Equipment

Tractor cultivator mounted seed planter

This planter can be mounted to the tractor drawn cultivator which is commercially available. This is useful for line sowing of crops like groundnut, sorghum, maize, pulses and paddy. Suitable for sowing larger area in less time before the moisture is depleted in the dry tracts.

Seed box along with cup feed type seed metering mechanism are mounted on the cultivator frame and the seeds are dropped in the furrows opened by the cultivator shovels. Detachable side wings are fixed to the existing shovel type furrow openers of the cultivator which helps in placing the seed at required depth. Power to operate the seed metering discs is taken from the ground wheel drive through clutch. A square bar is provided at the back of the unit to close the seeds in the furrows. The row to row distance is adjustable by changing the position of the cultivator tynes. The seed to seed distance can be changed by changing the sprockets provided in the metering shaft. While sowing, headland pattern has to be followed. Marker is provided for easy operation. The operator can stop the dropping of the seeds by disengaging the clutch provided. It is recommended to operate the unit below 4 kmph speed. The top link has to be adjusted such that the top portion of the seed box remains horizontal while the unit is in operation. The field capacity of the planter is 4 ha/day.

Basin lister cum seeder attachment to cultivator

These implements are used to form basins at regular intervals while sowing of crop in dry farming and conserve adequate soil moisture for the utilization of crop at its critical stages. The basin lister consists of

three trenchers of width 30 cm, cams, cam shaft, cam follower, ground wheels and frame. The penetrating portion of the trencher bottoms are provided with a replaceable share point. Each trencher fitted with a cam follower gets lifted up by the cams at equal intervals. The cams are mounted on a common axle at 120 degree difference and supported by ground wheels. The power to rotate the cam is transmitted from one of the ground wheel. To reduce wheel slippage, spring tension has been provided.

The basin lister unit is attached to the standard nine tined cultivators. The seed box along with cup feed type seed metering mechanism is mounted on the cultivator frame and the seeds are dropped in between the basins. Seeds are sown in 4 rows at 45 cm apart. Power to operate the seed metering discs is taken from the ground wheel through a clutch. The seed to seed distance can be changed by changing the sprockets provided in the metering shaft. The operator can stop the dropping of the seeds by disengaging the clutch provided.

The same implement can be used to form broad beds separated by furrows by removing the basin lister attachment from the cultivator. The unit consists of two sheet metal floats fixed on both the sides of the cultivator tynes to form the broad beds separated by furrows at intervals of 180 cm. An area of 3.5 ha can be covered per day.

Ridger seeder (Tractor drawn)

Suitable for forming ridges and sowing seeds like sorghum, maize, pulses, etc along the sides of the ridges. Tractor drawn ridger seeder consists of a seed box, seed metering mechanism, ground drive wheel, power transmission system, seed calibration lever, seed shutter

lever, furrow opener all fixed to the frame mounted on the two bottom tractor drawn ridger. In the trapezoidal seed box there are six slots and six numbers of fluted type rollers are housed on a common shaft for controlling the seed rate. The ground wheel at the rear drives the seed metering mechanism. A spring tensioner is provided to minimize the slippage of the ground wheel. The seed calibration lever controls the flow rate and the seed shutter lever positions the slotted plate to the corresponding slot in the seed box for sowing either on one side or on both sides of the ridges as required. Mild steel tubes are fixed on either side of the ridger bottom to act as furrow openers for the placement of seeds. The field capacity of the ridger seeder is 3.5 ha / day.

Tractor drawn paddy seeder

This seeder can be mounted to the tractor drawn cultivator which is commercially available. This is useful for line sowing of paddy. Suitable for sowing larger area in less time before the moisture is depleted in the delta regions before the water is let off in the canal.

Seed box along with cup feed type seed metering mechanism are mounted on the cultivator frame and the seeds are dropped in the furrows opened by the cultivator shovels. Detachable side wings are fixed to the existing shovel type furrow openers of the cultivator which helps in placing the seed at required depth. Power to operate the seed metering discs is taken from the ground wheel drive through clutch. A square bar is provided at the back of the unit to close the seeds in the furrows. The row to row distance is adjustable by changing the position of the cultivator tynes. The seed to seed distance can be changed by changing the sprockets provided in the metering shaft. While sowing, headland

pattern has to be followed. Marker is provided for easy operation. The operator can stop the dropping of the seeds by disengaging the clutch provided. It is recommended to operate the unit below 4 kmph speed. The top link has to be adjusted such that the top portion of the seed box remains horizontal while the unit is in operation. An area of 4 ha can be covered per day.

Lowland paddy seeder

Transplanting of paddy seedlings in wetland is the widely accepted cultivation practice. Labour involved in nursery rising and transplanting constitutes 30 per cent of total labour required in paddy cultivation. During peak transplanting seasons, labourers are not easily available. This leads to delayed transplanting with aged seedlings, resulting in reduction in yield.

This equipment is used for sowing pre-germinated paddy seeds directly in wet land without transplanting. The paddy seeder consists of two seed drum hoppers, two skids, a 600 mm diameter internally lugged ground wheel and a handle all fixed in a framework made of 16 mm diameter conduit pipe. The seeder is capable of sowing 8 rows at 150 mm row spacing or 6 rows at 200 mm row spacing. The fields are to be well ploughed, puddled and levelled at least two days before operating the seeder. The required seed rate is 50 kg per hectare. The yield is on par with transplanted paddy. Weeding and interculture made easy using long handled tools. Two labourers (operator & helper) are needed to cover one ha. The field capacity of the unit is one hectare per day.

Paddy cum daincha seeder

The paddy cum green manure seeder simultaneously sows paddy seeds (pre-germinated) and daincha (*Sesbania aculeata*) seeds (not pre-germinated) in alternate rows on puddled soil. The seeder has two drum hoppers, two skids, a ground wheel and a handle and weighs only 15 kg. The seeder sows three paddy rows and three green manure rows covering 750 mm in a single pass. Using two labourers 0.20 to 0.40 ha is sown in a day depending on the soil sinkage. Daincha is sown at 30 to 40 kg per ha. Paddy seed rate can be adjusted from 70 to 85 kg per ha. The green manure rows raised in between paddy rows are trampled into the puddled soil when the green manure crop attains 400 to 450 mm height (about one month after sowing) using cono-weeder. While trampling green manure crop, weeding is also done by the cono weeder. Age of paddy crop is reduced by 10 days because the establishment shock of seedlings is avoided. Yield of paddy increases by 600 to 1000 kg/ha. Organic manuring is done at the rate of 7 to 8 t/ha in 4 to 5 weeks. The field 0.20 to 0.40 ha /day.

Tapioca Sett Cutter

It is used for cutting of tapioca setts for planting. The unit has two crescent shaped cutting edges made of steel. One knife is fixed at the bottom to the 'L' angle mounted on a wooden piece and the other is welded to the top handle made of M.S. pipe. A wooden plank is provided at one end to ensure stability. The cut setts have smooth and undisturbed cutting edges which ensure good sprouting. The capacity of the unit is 1100 setts/hr.

Post hole digger

Hole digger is an implement that wills drill/dig holes of varied sizes and depths for planting seedlings and saplings. It is an attachment to the tractor three point linkage with category I &II mountings. The unit consists of an auger, which is driven through bevel gears by the tractor power take off. The power transmission is through universal drive shaft. Replaceable auger points of size from 15 cm to 60 cm are provided. The maximum diameter of the hole is 60 cm and the depth is 90 cm. The cost of the unit is Rs.85000. Powertiller operated post hole digger are also available through which 30 cm dia and 30 cm depth holes can be formed. The cost of the unit is Rs.40000/-

Interculture and weeding

Hand/manual weeding is the most common practice adopted by the farmers. Manually operated weeders are available, but the capacity is only 10-20 cents per day. So in large farms timely weeding could not be done by these weeders. Timely weeding is most important than the frequency of weeding. So to complete the weeding operation within the specified period of time, farmers have to engage more labour and hence it leads to labour scarcity and more cost. In order to overcome these difficulties manually operated and power operated weeders were introduced.

Power rotary weeder

The power weeder is useful for weeding in between rows of crops like groundnut, tapioca, cotton, sugarcane, maize, orchards, coconut and arecanut plantations. The engine operated power rotary weeder consists of a 5.4 hp 34 kg diesel engine (Lambordini) mounted on the frame.

From the engine, the power is transmitted to the transmission gear box and then to the ground wheels and rotary weeder. There is provision to adjust the wheel settings according to the row to row spacing of the crop. A clutch with lever from the operators' handle actuates the simple idler pulley to engage or disengage the power transmission from the engine to the ground wheels. Another clutch provided between the gearbox and the rotary weeder permits engaging or disengaging power to the rotary weeder. The rotary weeder consists of three row of discs mounted with 6 number of curved blades in opposite directions alternatively in each disc. These blades when rotating enable cutting the weeds and mulching it in the soil. The width of coverage of the rotary weeder is 350 mm and the depth of operation can be adjusted to weed and mulch the soil in the cropped field. In addition to the rotary weeder, sweep type blades, junior hoe, the cultivator or ridger the operator can fit to the unit in place of rotary weeder easily. An area of 0.8 ha/day can be covered.

Mini tractor

Now-a-days mini tractors are used for various operations especially secondary tillage for interculture, making trenches, channel farming etc., where use of regular sized tractors is not possible. These types of mini tractors are ideal for horticultural crops due to its small size, which also allows it to manoeuvre between trees in orchards. Some of the mini tractor can also be used for plant protection aspects in plantation crops.

Plant protection Machinery

Power tiller operated boom sprayer

This attachment consists of spray boom, mast, spray pump, pressure regulator, chemical tank, double tail wheel and foliage deflectors. The tail wheels are carried on a separate frame hitched to the power tiller's hitch bracket. The system allows a shorter articulated turning with minimum turning radius of 1.1 m. The hitched frame was also made rugged to carry the 100 litre chemical tank made of reinforced fibre Tread width can be adjusted from 55 to 85 cm. Hence spraying of various horticulture crops like turmeric can be done. Spray boom of length 6 m was chosen with 3.0 m either side of the power tiller. The boom has ten hollow cone nozzles with total discharge rate of 7.3 l/min. The boom is mounted on the front of the power tiller on a separate mast and carried by a height adjustable apron sliding on the mast. At the top of the mast two M.S. rollers were provided to direct a pair of stay wires which support the boom in the required position. The stay wires, provided for lifting the boom to vertical position facilitate easy transport. Each section of the boom can be fitted with required number of nozzles to suit the crop. The nozzle spacing is made continuously adjustable. A single stage reciprocating pump with built-in pressure regulator and pressure gauge pumps the fluid to the boom. A cut-off valve is also provided on the discharge time to the boom to avoid dripping from the nozzles while closing the spray down. Operator can do spraying by sitting on the seat provided on the hithed frame.

Self propelled high clearance sprayer

The machine consists of a 20 hp diesel engine, gear box, a 1000 litre tank, seat for the operator, spray pump and a boom with 16 nozzles. The pump is of piston type and nozzles of hollow cone type. The engine is mounted on the chassis which has a ground clearance of 120 cm. The front wheels are narrow in width (20 cm) and are commercially available. The rear wheels are steering wheels. A ladder has also been provided on the sprayer for riding on the machine. The gear box provides four forward speeds and one reverse speed. The 1st and 2nd gears are for field operation while the 3rd and 4th gears are for road transport. The field speed is up to 5 km/hr and the road speed is up to 25 km/hr. the boom height can be adjusted from 31.5 cm to 168.5 cm to suit different crops. The nozzles are spaced at 67.5 cm and total boom length is 1080 cm while swath of sprayer is 1200 cm. The drive to the pump is given directly from the engine with the help of a v belt drive. A clutch is provided to engage or disengage the power to the spray pump. Provision has also been made to supply the liquid insecticide from the spray pump independently to three sections of the boom namely central, left and right. Left and right sections of the boom can be folded during transport. A relief valve has also been provided with the pump to adjust the spray pressure. The machine has been provided with the steering wheel on the top of the platform. The steering wheel steers the rear wheels with the help of mechanical linkages. Left and right front wheels can be braked independently. Guards have been provided in front of the drive wheels to deflect the crop branches away from the wheels. This feature reduces the crop damage. The wheel tread is 135 cm and during operation 2 rows of cotton crop come under the machine chassis. Seat for the operator on the

chassis is provided above the highest boom position to provide safety to the operator against chemicals. Machine weighs 1900 kg with full tank

Harvesters:

Self propelled vertical conveyor reaper

This machine is used for harvesting non-lodging paddy crop. The machine consists of gear box, ground wheels, handle, cutter bar assembly, star wheels and gathering header assembly. The crop should be manually harvested along the four sides of the field for a width of 0.5 m and cleared from the field for providing space to the machine. At one corner an area of 2 x 1.5 m should be manually harvested to place the machine initially in the field. Since the harvested crop is discharged at the right side of the reaper the harvester should be turned always to the left side. The height of cut is 50 mm and fuel consumption is 1 litre per hectare. The field capacity of the reaper is 1.5 ha / day.

Mini paddy combine harvester

The riding type small combine consists of two reciprocating cutter bars, one for cutting of ear heads and the other for cutting the remaining stubble. It is driven by a diesel engine. The header unit has a four bar reel for guiding the ear heads towards the cutter bar. The converging auger guides the cut ear heads towards the threshing cylinder. A spike tooth cylinder and a concave and cylinder casing with inclined louvers are provided. The threshed material is cleaned with the help of a screen and aspirator. The bruised straw is thrown out at the end of the threshing cylinder. A sack holder and platform is provided for bagging cleaned grain. A manual hydraulic pump is provided for raising the header unit and a mechanical lever is provided for the lower cutter bar. This helps to

harvest crops of different height. The field capacity of the machine is 0.11 ha h^{-1} .

Groundnut Harvester

The groundnut harvester is used for harvesting and windrowing groundnut crop at soil moisture levels of 8 -15 %.The groundnut harvester consists of a soil loosening tool and uproot the plant, a pick up conveying mechanism and gatherer windrower. The soil engaging tool is made of 15 mm thick x 100 mm wide x 1800 length straight mild steel blade. The tool at 15 deg rake angle is fixed to a main frame through shanks at both the ends. The pickup conveying mechanism of length 1700 mm is made of two 6mm endless ship chains spaced at 1800 mm apart. Both the chains are connected by conduct pipes spaced at 90 mm. Straight pegs of 100 mm long with end projection are fastened to these pipes at 75 mm spacing in a staggered manner. At the rear a gatherer windrow the conveyed crop. It is operated by a 35 hp tractor. The break-even point is 17 ha per year and payback period is 5 years. The field capacity of the harvester is 2.0 ha / day.

Turmeric Harvester

The unit consists of a curved blade with three bar points for easy penetration into the soil. The blade is fixed at an inclination of 25 degrees to the horizontal. To the rear end of the blade two oscillating sectors with six slats spaced at 25 mm apart are hinged at both ends. The oscillating motion for the slats is obtained through eccentric provided on either side of the unit. The eccentrics are connected to the main shaft provided at the top portion of the unit. From the gear box the power is transmitted to the main shaft of the turmeric harvester unit through V belt transmission. The

eccentrics mounted on both the ends of the main shaft provide oscillating motion to the two slat portions through suitable linkages. The unit is attached to the rear of the power tiller through hitch bracket assembly. For digging, the bar points with the blade penetrate into the soil, lift the turmeric rhizomes along with the soil. When the dug rhizomes with the soil travel along the slats, the oscillating motion of the slats separates the rhizomes from the soil. The soil slip back to the ground and the dugout rhizomes get deposited on the soil surface. For controlling the depth of operation wheels are provided on either side of the unit. The pneumatic wheels of the power tiller are replaced with a pair of special type cage wheels to accommodate the height of ridges. The cost of the unit is Rs. 30,000. Harvesting turmeric rhizomes with power tiller based harvester resulted 65 per cent saving in cost is achieved when compared to manual digging.

Tapioca harvester

The developed harvester consists of main frame, shanks, digging blade, hitching frame and depth adjustment wheels. It is designed for both two rows and single row operation. The shank was designed as a bent leg plough with an angle of 150 deg to accommodate the dug cassava tubers. The blade angle of 20 deg is provided for easy penetration in to the soil. The row spacing can be altered by moving the shanks in the main frame. The depth wheels are provided to adjust the depth of operation. The harvester is suitable for all soil conditions except dry and compacted heavy clay soils. The coverage was 0.08 ha/h for single row and 0.12 ha/h for double row. The undug tuber was 2.5% and damage was less than 1%.

Impact type Groundnut Stripper

The machine consists of a 1.2 m long peg type stripping cylinder fitted with rigid stripping fingers. The fingers are mounted on eight bars. The fingers are made of 70 mm long 6mm diameter mild steel rods and are spaced at a spacing of 50mm. The fingers on alternate bars are staggered. The cylinder revolves at 200 rpm and is powered by 1.8 kW petrol start kerosene run engine. The drive is transmitted to the thrashing drum through V belt reduction. The drum is enclosed all-around except for the feeding window. A feeding platform is provided for the operator to conveniently hold and thrash the crop. The machine is supported on wheels for transporting in the field. The vines are held by the operator and the root zone is exposed to the beater fingers for stripping the pods. The machine is designed for two operators to work simultaneously. The operators are assisted by two helpers who arrange the plants and hand over to the operator. One woman labour is employed to clean the stripped material by removing trash. The machine can strip crop grown in 1 acre of land in one day.

Pulse Thresher

The pulse thresher is useful for removing kernels from black gram, green gram and horse gram. In this machine the pulse crop can be fed as whole plant and as well the pods alone. While feeding with whole plant the crop has to be held manually on the root side so as the pod portions alone detached at the threshing cylinder. The separated kernels are subject to air blower for removal of dust and dirt. The clean pulse grain are obtained in the outlet chute. The capacity of the unit is 8 quintals of pulse kernel per day.

Groundnut thresher

This machine is used for threshing freshly harvested groundnut crop having high moisture. The thresher is of axial flow type and consists of feed hopper, spike-tooth cylinder, concave, oscillating sieves and blower. The pegs are arranged in 10 rows on the cylinder. The cylinder is enclosed with the concave made of wire mesh with sieve opening of 80 x 25 mm size. Below this cylinder and concave assembly, two oscillating sieves are fitted to separate the pods from leaves, soil and other dust materials. The blower fitted in between the two sieves helps to blow out the leaves. It is operated by a 5 hp electric motor or by the PTO of the tractor. The overall dimension of the machine is 1850 x 1600 x 1725 mm and weighs 350 kg. The capacity of the unit is about 200 kg pods per hr.

Husker Sheller for Maize

The machine is suitable for simultaneous removal of the sheath around the maize cobs and separating the maize kernels from the cobs. The husker Sheller consists of a hopper, rotor sieve, blower, auger and an elevator. The removal of sheath and shelling of cob take place in the rotor sieve assembly. The shelled kernels are carried by the auger to one end and are then elevated to the desired level for easy collection. The shelling efficiency is 98%. The saving in the time of shelling is 95% and saving in the cost of shelling is about 60 per cent. The capacity of the unit is 85 quintals of cob / day or 24 quintal of kernels / day.

Sunflower Sheller

It is used to shell the sunflower seeds and to separate the husk. The sunflower sheller consists of a high speed rotor, a rubber lined stator,

a blower and a sieve assembly. The rotor consists of six curved vanes with two flutes each. The stator is a tapered wooden surface lined with a thick hard rubber. The seeds are fed into the hopper and are graded by the sieve assembly. The graded seeds are fed into the elevating mechanism from where they pass through the inlet of the rotor. The rotor throws the seeds on to the stator at a high velocity and the seeds get shelled by the impact force. The shelled material is subjected to an air blast in a chute and the husk is separated. The shelled kernels are separated in the sieve assembly. Oil extraction studies conducted revealed that the quantity of oil extracted increased from 23.5 per cent to 31.8 per cent of the total seed weight by using shelled kernels instead of extracting oil from the whole seeds. The quality of the oil as well as cake is much superior in the case of shelled seeds. The capacity of the unit is 10 quintals of seed /day.

Castor Sheller

Traditionally castor is shelled manually after drying under sunlight, either by beating with wooden pluck. The castor sheller is used for shelling and cleaning castor pods. It consists of feeding hopper, rubber coated disc type shelling unit and a blower. Castor is fed to the shelling unit through feed hopper. It is suitable for shelling and winnowing of dried castor pods. The unit can be either operated manually or with a 0.5 hp electric motor. It saves 88 per cent labour and operating time and 69 per cent on cost of operation compared to conventional method of manually beating or rubbing with wooden plank. The capacity of the unit is 165 kg /h.

Other Equipment

Axial flow pump

The unit consists of an axial flow impeller, pump shaft, casing pipe, pump stand and swivelling mount for hitching to the power tiller. The impeller has two axial flow vanes and is designed for maximum water discharge. It is placed on the suction side of the casing pipe and is positioned appropriately by a bearing block suitably spider armed and fitted to the casing. The main pump shaft is supported by the spider-armed bracket and a simple bushed bearing with a stuffing box to prevent leakage of water. The shaft is driven by a B type V belt directly from the power tiller's engine pulley. The pump as a whole is supported by a pump stand at the discharge end which also provided for easy attaching or detaching of the pump from the power tiller. A telescopic swivel assembly facilitates the pump to be mounted to the power tiller front. It allows the pump to be swivelled laterally to adjust the reach of the pump to the water level and thereby provide lift from 1 to 3 m. The mean discharge of the pump is 3000 litre/min. against a total head of 2 m. The pump is useful for canal and river water pump. The cost of the pump is approximately Rs10000/-

Power Tiller Operated Slasher cum In-situ Shredder

Incorporation of crop residues into the soil ensures rapid decomposition. The most rapid decomposition occurs when residue is placed 10 cm deep and shredding crop residues also allows for rapid decomposition. Power tiller is an ideal power source for small and medium farmers. The power tiller operated slasher cum in-situ shredder was developed for use in vegetable gardens and orchards for shredding

the crop residues and weeds. The functional components of the unit are: slasher assembly, power transmission system, and hitch frame. The machine is front mounted on the power tiller chassis frame. Power is transmitted from engine pulley of the power tiller to bevel gearbox through v-belt. The slashing assembly consists of four cutting blades fitted on to a curved rotary header. The cutting blades are made up of high carbon steel and heat treated to required hardness. Protection hood is provided to protect the operator and also to confine the crop within the zone of shredding. The slasher cum in-situ shredder can be operated in an area of 0.8 ha per day of eight hours. The power tiller operated slasher cum in-situ shredder give 73 per cent saving in cost and 75 per cent saving in time when compared to conventional method of removing standing crop residues. The cost of the unit is Rs.15000.

Brush cutter

Power operated brush cutters are more powerful machines; they can clear high grass and heavy weeds. It is operated by 1 hp petrol engine. It consists of a circular rotating disc with serrated edges. A baffle guard is provided to protect the user from flying grasses and stones. The unit can be moved in various directions to the left and right.

Coconut tree climber

Coconut tree climber is having two components, the upper component can be operated by the hand and the lower component can be operated by the foot. The two components are connected by adjustable belts. The upper component is provided with a seating arrangement and the lower component is having provision for holding the foot. The unit is fitted in the coconut tree with the upper component above the lower

component. By standing on the lower component, the upper component can be slide up or down over the tree. Similarly, by sitting in the upper component, the lower component can be slide up or down over the tree. The operator can climb or descend the tree by operating the upper and the lower components alternately. Since, the operator is safely held against the tree by the upper component, there is practically no problem of falling down of the operator. Even, unskilled persons can easily operate the device. Weight of the unit is 13 kg and cost is Rs.3000/-.

Hoist

The Aerial Access Platform consists of hoist assembly, hydraulic control circuit, electrical control circuit and integration of hoist and tractor. Base unit is mounted to the rear of the tractor behind the operator. It is a hollow box section which houses a hydraulic tank. Above the base is the slewing unit. The slewing unit is mounted on large bearings to ensure free turning of the hoist by 360 degrees. The slewing action is by a worm and worm wheel. The worm is driven by a high torque radial plunger type hydraulic pump. The pump is fixed to the housing and is stationary. The entire hoist is operated by hydraulic power. The electro hydraulic controls are housed in the rotating part of the hoist. The pump and tank lines are fed to the rotating assembly through a rotary joint below the slewing unit. This enables 360° rotation without any interruption. The unit is used for plucking coconuts in coconut groves.

The demand for Agricultural machinery in future will be more for high capacity crop production equipment mainly to be used on custom hiring basis and on commercial farms. Hence to promote mechanization, the following guidelines may be followed.

- ✓ Area – crop specific strategies for mechanization have to be planned and executed to meet the requirements of the farmers.
- ✓ For supply of quality implement and proper selection and operation, training and testing facilities for agricultural machinery available in the country will have to be fully exploited and such facilities will have to be increased in all the states.
- ✓ Extension services for introduction, demonstration and popularization of agricultural equipment, will have to be strengthened up to grass root level through development of man-power and coverage under Radio, T.V. programmes and Non Governmental Organizations.
- ✓ Development and implementation programme of agricultural engineering will have to be increased substantially for constant development in agricultural mechanization in the country.
- ✓ Extending credit facilities through financial institutions with subsidy to the Non Governmental Organizations, Cooperative farming organizations involved in the custom hiring of high capacity machines for the benefit of farming community.