



भाकृअनुप - केन्द्रीय बारानी कृषि अनुसन्धान संस्थान

ICAR - Central Research Institute for Dryland Agriculture

संतोषनगर, सैदाबाद-पोस्ट हैदराबाद ५०००५९ Santoshnagar, Saidabad P.O. Hyderabad ५०० ०५९

040-24530161,24530163,24530224 Fax:040-24531802 www.crida.in Email : stores@crida.in



F. No: 2-1/(92)/2016/ST

Date: 04.03.2017

Closing Due date up to 12-03-2017

Sub: Quotation is invited for Prototype model of CRIDA tractor drawn front mounted Hydraulically operated harvester for harvesting the Sorghum and Maize crops- Reg.

Dear Sir (s),

Quotations are invited for following items cited below:

S. No	Name of the Items	Qty
1	Prototype model of CRIDA tractor drawn front mounted Hydraulically operated harvester for harvesting the Sorghum and Maize crops Annexure -I copy enclosed	1No
	Condition: 1) All Design and other IP rights are reserved with ICAR-CRIDA, vendors cannot claim any IP rights on this design or any other concepts related to this 2) Vendor cannot fabricate the same without ICAR-CRIDA approval	

TERMS & CONDITIONS

- The last date for submission of quotation is on or before **12-03-2017**. Rates offered shall be F.O.R. CRIDA, Hyderabad
- Quotations should be sent by post only in a sealed cover addressed to the Director, Central Research Institute for Dry land Agriculture, Santoshnagar, Saidabad Post, Hyderabad - 500 059. The cover containing quotation should invariably be super scribed. The quotations in person by hand will not be accepted.
 - Enquiry F. No: 2-1/(92)/2016/ST
 - Due on 12-03-2017
 - For Prototype model of CRIDA tractor drawn front mounted Hydraulically operated harvester for harvesting the Sorghum and Maize crops
- The quotation should remain open for acceptance for a period of 90 days from the date (due date)
- An earnest money of **Rs.4000 (Rupees Four thousand only)** should be deposited in the form of Demand Draft / Banker's Cheque in favour of 'ICAR Unit - CRIDA' payable at Hyderabad. The quotation will not be considered if earnest money is not deposited with the tenders.
- The earnest money would be refunded to all the unsuccessful bidders. For Successful bidders the earnest money would be refunded only after deposition the Security deposit/Performance Guarantee.
- An amount of 10% of total order value as Security Deposit (Performance Guarantee) in the form of DD/ PO/Bank Guarantee/FDR** for the supply of Rotary shaker is to be deposited by the successful Bidder only after receiving a communication from the Institute. In the event of non-deposition of the same within 15 days of the communication, the earnest money will be forfeited. In the event of any default of performance or conditions of supply, the security deposit will be forfeited.
- No advance payment/delivery against payment is permissible. However, the payment shall be arranged in 10 days from the date of submission of pre-receipted bill in triplicate along with stores.
- The rates quoted should be net payable for each item for delivery at the Institute at the address given above (inclusive of all taxes, packing, forwarding, transport, insurance and excluding rebate/discount etc.)
- This Institute is not in a position to supply any 'D' or 'C' forms.
- While quoting the rates please mention the following:
 - Approximate time for supply of stores from the date of placing order.
 - Guarantee/Warranty/Expiry period
 - In case you have got any rate contract with the DGS&D, the same may be indicated
 - Any other condition

Quotation which do not conform to the above terms and conditions will not be considered. The Director, Central Research Institute for Dryland Agriculture, reserves the right to accept or reject any or all quotations without assigning any reasons thereof.

Yours Sincerely

(Er C V K N Rao)
Stores and Purchase Officer

Annexure -I

Design and Development of Sorghum Harvester

Description:

This newly conceived design consists of two pairs of oppositely rotating rotary cutters to cut crop stems by impact. On same axis of rotation of cutting blades, rotates two pairs of oppositely rotating cylinders covered with fins. To catch and convey cut stems. Just behind the cylinders is a horizontal roller with helix around it and behind is an inclined conveyor that rotates to windrow crop falling on it. Function of each part is explained briefly as follows:

1. Hydraulic motor is connected to shaft A to give drive to rotary cutters.
2. Shaft A is a single shaft rotating in clockwise direction at an rpm of 850 and on it four rotary cutters are fixed through bevel gear pairs for each cutter.
3. Rotary discs are mounted on hollow shaft which gets drive from bevel gear pair. Bevel gears are arranged in such a way that from left to right in the figure, first disc rotates in anticlockwise direction and second in clockwise direction. Similar rotation configuration has been designed for the other pair of cutters too.
4. Four cutting blades at 90 degrees on each disc have been fixed with nut and bolts for the impact cutting of sorghum stems. Blades are 40mm outside disc to ensure cutting of stems that range from 15mm to 30mm diameter.
5. To transfer drive from shaft A to shaft B, sprocket and chain is used in such arrangement that shaft B rotates in 200 rpm.
6. Shaft B rotates at 200 rpm and is responsible to rotate the four cylinders. Four bevel gear pairs are fixed on Shaft B to which are fixed four pulleys. Bevel gears are arranged in a manner to drive first pulley from left to right in figure 1, in anticlockwise direction and second in clockwise direction. Similar arrangement is done for the other pair of pulleys too.
7. Inside the hollow shaft of rotary cutter, shaft of smaller diameter is inserted to which rotating cylinders are fixed. Belt and pulley arrangement is given to transmit rotation from shaft B to shaft of rotating cylinders.
8. Clamps are given in order to give structural support to the rotating cylinders.
9. Two pairs of rotating cylinders of diameter same at cutting disc are arranged with fins on the entire surface area to catch and convey cut crop to rear. In a pair, one cylinder rotates in anticlockwise direction and the other in clockwise direction. And by virtue of this opposing motion, cut stems can be conveyed from front to rear easily.
10. Five fins are fixed in a column and six such columns are designed on cylinder at 60 degrees angle. In a pair of cylinders, fins are fixed in columns such that while in rotation, in between two fins of second cylinder comes one fin of first cylinder. This arrangement is designed with an aim to catch and hold stem until conveyed to rear.
11. To the rear of cylinders, a horizontal roller rotating at 200 rpm in anticlockwise direction with helix of 1 cm height is fixed. This roller gets drive from shaft B through gear drive. Once conveyed to rear due to motion of cylinders, stems need to be pushed further. To fulfill this function, horizontal roller has been designed. This will help in conveying stems from cylinder to conveyor.
12. A conveyor belt made up of rubber for high friction and light weight, with cleats of height 20mm at every 300 mm is fixed at the rear of roller. It is designed for adjustable inclination from front to rear and rotatable at 60-90 rpm in clockwise direction from front view. Its function is to convey and windrow the cut crop stems. Conveyor is hydraulically driven and has a gear box to reverse the direction of rotation of conveyor belt.

DETAILS OF SORGHUM HARVESTER PARTS

S.No.	Name of part	Specifications (mm)	Description	Function
1	Horizontal bottom	1270X420X150 T= 5	Box type structure with front side open and taper at top.	Base structure of harvesting unit providing space for drive units for rotary cutters and cylinders.
2	Rotary cutting discs	D=220 T =5	Discs rotating on top of horizontal bottom, driven by bevel gears at bottom.	2A-Disc rotating in anticlockwise direction
				2B- Disc rotating in clockwise direction
				2C- Disc rotating in anticlockwise direction
				2D- Disc rotating in clockwise direction
3	Cutting blades	A=750,B=450,H=80, t= 5	Trapezoidal in shape, four in number bolted on each cutting disc.	Cutting the crop stem while rotating due to impact force.
4	Shaft 3	D = 20, H = 100	Four shafts inserted into each of the hollow shaft-4 at bottom end. Cylinder mounted on each shaft at the top.	3a – Drives mounted cylinder into anticlockwise direction.
				3b - Drives mounted cylinder into clockwise direction.
				3c - Drives mounted cylinder into anticlockwise direction.
				3d - Drives mounted cylinder into clockwise direction.
5	Pulley -1	4 inches	Four pulleys mounted on each of the shafts 3a, 3b, 3c & 3d.	To take drive from pulley 2 and rotate shafts 3a, 3b, 3c & 3d in respective rotational motions.
6	Pulley- 2	4 inches	Four pulleys mounted on four small vertical shafts at bottom getting drive from bevel gears mounted on shaft 2. No part is mounted the top of it.	Takes drive from shaft 2 and transfers to pulley-1 through belt and helps to rotate shafts 3a,b,c & d.
7	Shaft 1	D = 20, l = 1370	Mounted on horizontal bottom at height 40 from ground. At one end it gets drive from hydraulic motor-1 and the other end, sprocket chain is fixed to it. Four pairs of bevel gears are mounted on it at particular distances.	It gets drive from hydraulic motor-1 and rotates in anticlockwise direction. It gives drive to the four pairs of bevel gears mounted on it.
8	Cylinders	D= 220, h= 700, t =30	Four cylinders are mounted on each of the shafts 3a, b, c & d. on its outer surface, fins of rectangular shape are fixed at equal intervals	8A – Rotates in anticlockwise direction to catch and convey cut stems.
				8B – Rotates in clockwise direction to catch and convey cut stems.
				8C – Rotates in anticlockwise direction to catch and convey cut stems.
				8D – Rotates in clockwise direction to catch and convey cut stems.
9	Holders		Four in number are fixed on the top of vertical guard structures at one end and encircle shaft of rotating cylinders at the other	Gives structural balance and strength to rotating cylinder while in operation.
10	Shaft 3	D= 40, l = 1370	Fixed at a height of 140 mm on vertical guard. At one end it gets drive from shaft 2 through chain and sprocket and free at other end.	Takes drive from shaft 2 and transfers to horizontal roller.

11	Horizontal roller	D= 100, l= 1150,	It is fixed on shaft 3 with helix of height 10mm around it along the length. It is divided into two parts of 575 mm each. Gets drive from shaft 3.	Its function is to pull and push the stems conveyed from cylinders to inclined conveyor.
12	Inclined conveyor	L= 1270, W = 700, D= 100	Fixed on the frame behind horizontal roller, with cleats of height 20mm at every 300mm throughout belt. It is inclined at angle of 45°. Gear box is mounted in drive that can reverse the rotation of conveyor.	It pulls and conveys cut stems from front to the side in order to windrow them. It gets drive from Hydraulic motor-2.
13	Vertical Guards	420X190X810 t= 3	Two on each side, fixed on top of bottom.	Guards the components of harvesting unit from both sides and acts as supporting structures.
14	Shaft 2	D= 20, L = 1370	At right side from front, it gets drive from shaft 1 through chain and sprocket. At the other end it gives drive to shaft 3 through chain and sprocket. Along the length, four pairs of bevel gears are mounted at particular distances.	Its function is to transfer rotational motion of shaft 1 to cylinders through belt and pulley and horizontal roller through chain and sprocket.
15	Fins	37.5X40, t= 1	Fixed around cylinders in 6 columns at 60° in 5 rows at equal distance of 83 mm. Columns are arranged such that the fins are fixed in staggered manner.	Its function is to catch and hold the cut stems until are conveyed behind.
16	Hydraulic motor-2	Suitable motor to drive and rotate conveyor.	Fixed on supporting frame structure for conveyor.	Drives and rotates the inclined conveyor.
17	Hydraulic motor-1	Suitable to rotate 4 cutters and 4 cylinders	Fixed on hydraulic clamp at left side of the horizontal bottom from front. Its shaft is connected to belt and pulley connected to shaft 1.	It rotates the shaft 1 to drive the entire harvesting unit i.e. rotary cutting discs and rotary cylinders.

Note; All the dimensions and shapes of different parts mentioned above may change during the fabrication stage and refinement stage. As the main purpose of this machine is to cut and convey the Sorghum/Maize stems to form a windrow. The fabricator should modify the machine as per the guidance and instructions given by the Indentor time to time till it works to the satisfactory level. Hence the Industry/vendor should quote the tender keeping the above things in view.

- 1 HORIZONTAL BOTTOM
- 2 ROTARY DISC
- 3 CUTTING BLADE
- 4 SHAFT FOR CYLINDER MOUNTING
- 5 PULLEY TO GIVE DRIVE TO CYLINDER
- 6 PULLEY TO GIVE DRIVE TO PULLEY 5
- 7 SHAFT-1 TO GIVE DRIVE TO CUTTING DISC
- 8 CYLINDERS (ROTATING)
- 9 HOLDERS (SUPPORTING STRUCTURES FOR CYLINDERS)
- 10 SHAFT-3 TO ROTATE HORIZONTAL ROLLER
- 11 HORIZONTAL ROLLER WITH HELIX
- 12 INCLINED CONVEYOR

- 13 VERTICAL GUARDS
- 14 SHAFT-2
- 15 BELT & PULLEY (MOTOR)
- 16 CHAIN & SPROCKET
- 17 HYDRAULIC MOTOR-1
- 18 HYDRAULIC MOTOR CLAMP
- 19 HOSE PIPES (4-MOTOR 1)
- 20 HOSE PIPES (ACTING CYLINDER)
- 21 FRAME STRUCTURE FOR CONVEYOR
- 22 TRACTOR ATTACHMENT UNIT
- 23 DOUBLE ACTING HYDRAULIC CYLINDER & PISTON
- 24 PINS
- 25 HYDRAULIC MOTOR-2

TRACTOR OPERATED SORGHUM HARVESTER