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ENERGY AND COST USE-EFFICIENCY FOR PRODUCTION OF MAJOR CROPS UNDER ADVANCE AND TRADITIONAL FARMS OF MADHYA PRADESH

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ABSTRACT

The present study examines the variations in the form and extent of energy utilisation and cost use efficiency in production of major crops along with its operational distribution followed by the assessment of energy gaps between advanced and traditional technologies in Madhya Pradesh. In comparison to the advanced technology of crop production operationwise energy hours spent on various crops under traditional technology was considerably lower. The yield levels were also lower under traditional technology. The aggregate output-input energy ratio was highest in case of gram and lowest in case of sugarcane under the traditional technology of crop production. The total output-input energy ratios ranged from 2.14 for soybean to 29.00 for sugarcane under the advanced technology. The overall sourcewise renewable energy use efficiency was higher on traditional farms while the overall average non-renewable energy use efficiency was higher on advanced farms.

Introduction

In the present age, nothing can be done without energy and the level of energy consumption has become the status symbol of the society, firm or industry and nation. Agriculture is the primary sector of Indian economy and one of the major claimants of energy for various operations done on the field and beyond. The level of production in agriculture and productivity of crops depend upon the energy inputs consumed during various farm operations. The sources of energy that go into the production of crops include material inputs such as seeds, fertilizers, manures, insecticides and mechanical energy along with human and bullock labour hours spent on executing the production process.

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Considerable variations in the form and extent of energy utilisation and cost use efficiency exist in production of major crops along with variations in its operational distribution. Besides examining these variations an attempt is made in this study to assess energy and cost gaps between advanced and traditional farms. The energy gap will have to be minimised, if the productivity level of crops are to be pushed-up to narrow down the yield gaps or the yield sacrifice for want of required energy inputs in production of various crops.

Methodology

In the year 1988-89 the total energy requirements for major crops in Madhya Pradesh was about 130317 TJ. The present study covers the entire state of Madhya Pradesh which is delineated in to five major crop zones, namely, rice zone, rice-wheat zone, wheat zone, jowar-wheat zone and cotton-jowar zone. From each crop zone a sample of 100 households spread over 12 villages in 12 districts was selected. The selection of districts and villages was based on the relative importance of the crops. Primary data pertaining to 1988-89 and 1989-90 were collected with the help of schedules by personal interview with selected farmers of each agro-climatic region of Madhya Pradesh. Secondary data were obtained from the published sources. The crops included in the study were paddy, soybean, jowar, wheat, gram and sugarcane. The energy and cost use efficiency in production of major crops along with its operational distribution followed by an assessment of energy gaps between advanced and traditional farms was attempted. The energy use in terms of sources and operations expressed in hours were converted in to MJ/ha ($10^6\text{J}=1\text{MJ}$). The energy units were further transformed into their money values to estimate the cost in relation to energy consumed.

The gaps between actual and recommended energy use levels examined for productivity gaps along with their monetary values. The recommended energy requirements are based on the package of practices for major crops recommended by agricultural scientists of Jawaharlal Nehru Krishi Vishwa Vidyalaya (MP).

Results and Discussion

Table 1 shows the operationwise use of energy in its different forms

such as human labour hours, bullock labour hours, tractor hours and electrical hours. In comparison to advanced technology of crop production, operationwise energy hours spent on various crops under traditional technology were considerably lower. The human labour hours spent on various crops per unit of land (ha) ranged from 246.75 hours in gram to 1550.40 hours in sugarcane under traditional technology. Under advanced technology the range was from 315 hours (gram) to 2202 (Sugarcane). The total bullock hours used ranged from 62.35 hours/ha (gram) to 273.50 hours/ha (sugarcane) under traditional technology which were much below the range estimated for advanced technology of crop production.

The traditional farms were found to be characterised by extremely low level of purchased inputs, namely, fertilizers, insecticides and diesel per hectare. The yield levels were consequently also lower than those estimated for advanced technology.

Advance technology and energy use efficiency

It may be observed from Table 2 that when physical energy hours and materials were converted into energy units (MJ), sugarcane (14114 MJ/ha) happened to be most energy intensive crop followed by wheat (11450 MJ/ha), paddy (5772 MJ/ha), jowar (4240 MJ/ha), soybean (4092 MJ/ha) and gram (3106 MJ/ha).

Operationwise energy consumption indicated that seedbed preparation accounted for most of the energy consumed in crop production followed by weeding, fertilizer application and sowing. Transportation in case of sugarcane was found to be an important operation from point of view of energy consumption (19.4 percent)

Aggregate energy (sources plus materials) consumption was highest (39049 MJ/ha) in case of sugarcane followed by wheat, paddy, soybean, jowar and gram (Table 3). Table 4 shows that the total input energy requirements of crops per hectare under advanced technology ranged from 6855 MJ to 39049 MJ. It was highest in case of sugarcane and lowest for gram. With the given output of main and by products per unit of area, total output-input energy ratios ranged from 3.96 for soybean to 33.60 for sugarcane. The benefit cost ratio, representing the returns and costs per hectare of crops, was found to be highest in case of gram (2.62) followed by

Table 1 : Average use of energy hours in various farm operation for raising different crops under advanced and traditional farm of Madhya Pradesh

		(hours/ha)				
Crops	Farms	Human	Bullock	Tractor	Electrical	Total
Paddy	a) Advance	1239.00	186.00	6.00	13.00	1444.00
	b) Traditional	974.30	143.40	3.48	2.75	1123.93
	c) Difference	264.70	42.60	2.52	10.25	320.07
Soybean	a) Advance	702.00	148.00	4.00	10.00	864.00
	b) Traditional	544.80	100.06	1.74	3.48	650.08
	c) Difference	157.20	47.94	2.26	6.52	213.92
Jowar	a) Advance	671.00	203.00	4.00	5.00	883.00
	b) Traditional	500.33	122.73	1.66	2.11	626.83
	c) Difference	170.67	80.27	2.34	2.89	256.17
Wheat	a) Advance	638.00	100.00	5.25	170.00	913.25
	b) Traditional	524.35	91.17	2.30	124.54	742.36
	c) Difference	113.65	8.83	2.95	45.46	170.89
Gram	a) Advance	315.00	86.00	3.50	20.00	424.50
	b) Traditional	246.75	62.35	1.60	6.63	317.39
	c) Difference	68.25	23.92	1.90	13.32	107.12
Sugarcane	a) Advance	2202.00	335.00	14.00	96.00	2647.00
	b) Traditional	1550.00	273.50	6.05	66.40	1895.95
	c) Difference	651.60	61.50	7.95	29.60	750.65
Total	a) Advance	5767.00	1058.00	36.76	314.00	7175.75
	b) Traditional	4340.53	793.21	16.83	205.96	5356.53
	c) Difference	1426.47	264.79	19.92	108.04	1819.22

Advanced : Recommended

Traditional : Actual use

wheat (2.44), sugarcane (1.92), soybean (1.68), paddy (1.39) and it was lowest (1.21) in case of jowar.

Traditional technology and energy use efficiency

Table 5 presents the operationwise estimates of energy use and the corresponding costs for the crops. Seedbed preparation consumed most of the energy units, ranging from 10 to 39 per cent of the total energy consumed. Sugarcane (9623MJ/ha) was found to be the energy intensive

Table 2 : Energy (MJ) and cost (Rupees) involved in various farm operation for raising different crops under advanced farms of Madhya Pradesh

(Per ha)

Farm operations		C R O P S					
		Paddy	Soybean	Jowar	Wheat	Gram	Sugacane
Seedbed	MJ	1649	1264	1260	970	819	1841
Preparation	Rs.	966	835	730	585	510	1140
Sowing	MJ	911	472	468	468	369	681
	Rs.	920	285	280	280	250	640
Bund making	MJ	70	—	—	121	72	251
	Rs.	90	—	—	85	51	183
Irrigation	MJ	647	105	191	7176	718	4717
	Rs.	130	27	30	1125	120	880
Weeding/ interculture	MJ	605	753	612	69	—	1909
	Rs.	875	830	585	100	—	2415
Fertilizer application	MJ	379	205	294	261	—	900
	Rs.	225	115	295	136	—	560
Plant protection	MJ	29	12	29	4	31	63
	Rs.	37	15	37	5	40	80
Harvesting	MJ	432	432	287	276	207	1020
	Rs.	625	625	415	400	300	1475
Threshing	MJ	626	559	721	1514	558	—
	Rs.	470	212	678	600	225	—
Transportation	MJ	424	290	378	591	332	2732
	Rs.	300	158	225	344	200	1462
Total	MJ	5772	4092	4240	11450	3106	14114
	Rs.	4638	3102	3175	3660	1696	8835

and most expensive (Rs. 6202/ha) crop. The magnitude of energy use was higher in wheat than paddy but the cost component for paddy was heavier than that for wheat. The cost of cultivation was lowest in case of gram (Rs. 1169/ha) which consumed 1719 MJ of energy per hectare.

Sourcewise energy utilized in crop production under traditional farms is presented in Table 6 along with the cost estimates per hectare for the crops. Human and bullock labour were the most common sources of energy utilized in crop production under traditional farms. Machine hours were an

insignificant source of energy, with energy use ranging from 1.00 to 3.00 per cent of the total cost per hectare. Fertilizers constituted about 5 to 10 per cent of the total energy cost in different crops although in terms of energy conversions, the percentage ranged from 10 to 30 per cent of total energy consumed per hectare.

Table 7 presents the summary of output-input relationship among crops in relation to energy consumption and economic considerations per unit of land. The input-output energy ratio was highest in case of Jowar (11.72) followed by gram (7.81), paddy (6.60), wheat (5.60) and soybean (4.06). It was lowest in case of sugarcane (2.17) under the traditional technology of crop production. It may also be noted from the Table that benefit cost ratio

Table 3 : Sourcewise energy (MJ) and cost (Rupees) requirements for production of different crops under advanced farms of Madhya Pradesh

(Per ha)

Sources		C R O P S					
		Paddy	Soybean	Jowar	Wheat	Gram	Soybean
Human	MJ	2188	1245	1196	1176	573	3905
	Rs.	3097	1754	1577	1595	795	5505
Animal	MJ	1877	1495	2048	1010	868	3383
	Rs.	1116	948	1278	600	516	2010
Diesel	MJ	1111	745	745	1006	633	2422
	Rs.	360	240	240	315	210	840
Electricity	MJ	596	607	251	8258	1032	4404
	Rs.	65	160	80	1150	175	480
Seed	MJ	1470	1470	117	1470	1102	5800
	Rs.	168	800	80	400	600	300
F.Y.M.	MJ	3000	2400	1200	1200	—	2250
	Rs.	400	320	160	160	—	300
Fertilizer	MJ	6611	2000	4000	6756	2166	15999
	Rs.	858	524	542	930	512	1915
Insecticide	MJ	120	90	20	100	250	360
	Rs.	65	60	59	222	128	340
Machinery	MJ	248	229	226	340	231	526
	Rs.	65	60	59	222	128	340
Total	MJ	17221	10281	9803	21316	6855	39049
	Rs.	6329	4896	4116	5402	3011	12290

was highest in case of gram (2.86), followed by wheat (1.97), soybean (1.28), paddy (1.20, and sugarcane (1.18), and minimum for jowar (0.74).

Advance v/s traditional technology of crop production

The traditional technology of crop production required lower magnitude of energy units that were required under advanced technology (Table 8). Consequently the cost per hectare for traditional technology were much

Table 4 : Yield output input energy ratios and benefit cost ratios for different crops under advanced farms of Madhy Pradesh

Items	C R O P S					
	Paddy	Soybean	Jowar	Wheat	Gram	Sugarcane
Yield kg/ha						
1. Grain	4200	1500	2500	4000	1500	75000
2. Straw	4200	1500	5000	4000	1200	11200
Total input energy (MJ/ha)	17221	10281	9803	21316	6855	39049
Total output energy (MJ/ha)						
1. Grain	61440	22050	36750	58800	22050	1132500
2. Straw	52500	18750	70000	50000	21600	180000
3. Total	114240	40800	126750	108800	43650	1312500
Specific energy for grain, MJ/kg output-input energy ratios	4.10	6.85	3.92	5.32	4.57	0.52
1. Grain	3.58	2.14	3.74	2.75	3.21	29.00
2. Straw	3.04	1.82	9.18	2.34	3.15	4.60
3. Total	6.62	3.96	12.92	5.09	6.36	33.60
Gross ratios Rs/ha	8820	0250	5000	13200	7900	23625
Cost of cultivation	6329	4896	4116	5402	3011	12290
Net return Rs/ha	2491	3354	884	7798	4889	11335
Benefit cost ratios	1.39	1.68	1.21	2.44	2.62	1.92
Cost of production, Rs/kg	1.50	3.26	1.64	1.35	2.00	0.16

Table 5 : Energy (MJ) and cost (Rupees) involved in various farm operations for raising different crops under traditional farms of Madhya Pradesh

(Per ha)

Farm operations		C R O P S					
		Paddy	Soybean	Jowar	Wheat	Gram	Sugarcane
Seedbed	MJ	1212	831	803	860	526	1364
Preparation	Rs.	688	611	694	637	406	1029
Sowing	MJ	615	319	267	323	305	630
	Rs.	457	224	200	244	218	563
Bund making	MJ	51	—	—	184	50	120
	Rs.	54	—	—	126	36	100
Irrigation	MJ	150	19	—	5370	174	3319
	Rs.	87	3	—	836	28	676
Weeding/	MJ	616	560	536	55	—	1344
Interculture	Rs.	605	569	528	64	—	1460
Fertilizer	MJ	243	63	25	91	—	488
	Rs.	146	44	29	61	—	378
Plant protection	MJ	7	2	26	1	10	31
	Rs.	7	2	32	2	11	38
Harvesting	MJ	355	288	258	360	235	548
	Rs.	335	319	298	403	256	644
Threshing	MJ	556	370	434	938	301	—
	Rs.	365	162	269	307	139	—
Transportation	MJ	173	128	261	165	118	1779
	Rs.	99	87	207	101	75	1314
Total	MJ	3978	2580	2612	8347	1719	9623
	Rs.	2843	2021	2257	2781	1169	6202

Table 6 : Sourcewise energy (MJ) and cost (Rupees) requirements for production of different crops under traditional farms of Madhya Pradesh

(Per ha)

Sources		C R O P S					
		Paddy	Soybean	Jowar	Wheat	Gram	Sugarcane
Human	MJ	1716	964	884	950	441	2750
	Rs.	1675	1066	1044	1107	501	3254
Animal	MJ	1448	1030	1270	960	625	2743
	Rs.	868	760	1041	735	482	2149
Diesel	MJ	688	326	312	448	305	1082
	Rs.	237	123	130	169	118	467
Electricity	MJ	126	258	146	5989	348	3048
	Rs.	63	72	42	770	68	332

Seed	MJ	1094	1431	128	1754	1491	6658
	Rs.	171	779	61	436	761	344
F.Y.M.	MJ	2702	146	124	390	0	1874
	Rs.	490	33	21	85	0	437
Fertilizer	MJ	1945	613	1174	2277	758	5685
	Rs.	246	165	157	305	184	695
Insecticide	MJ	30	15	26	3	21	62
	Rs.	38	22	65	2	7	78
Machinery	MJ	168	127	142	223	110	330
	Rs.	48	30	33	135	64	204
Total	MJ	9917	4910	4206	12994	4099	24232
	Rs.	3836	3050	2594	3744	2185	7960

Table 7 : Yield, output-input energy ratio and benefit cost ratio for different crops under traditional farms of Madhya Pradesh

Items	C R O P S					
	Paddy	Soybean	Jowar	Wheat	Gram	Sugarcane
Yield, kg/ha						
1. Grain	2408	739	980	2601	965	34380
2. Straw	2408	739	1966	2601	878	4586
Total input energy (MJ/ha)	9917	4910	4206	12994	4099	24232
Total output energy (MJ/ha)						
1. Grain	35406	10140	14412	38219	16185	46176
2. Straw	30107	9240	35222	32499	15818	7337
3. Total	65513	20107	49634	70718	32004	53513
Specific energy for grain MJ/kg	4.10	6.66	4.42	4.91	3.73	0.79
Output input energy ratios						
1. Grain	3.57	2.20	3.40	3.03	3.95	1.89
2. Straw	3.03	1.86	8.32	2.57	3.86	0.29
3. Total	6.60	4.06	11.72	5.60	7.81	2.47
Gross return Rs/ha	4618	3883	1904	7073	6270	9467
Cost of cultivation Rs/ha	3836	3050	2594	3744	2185	7960
Net return Rs/ha	782	833	-689	3329	4085	1507
Benefit cost ratio	1.20	1.28	0.74	1.97	2.86	1.18
Cost of production Rs/kg	1.60	3.93	2.76	1.43	2.04	0.26

Table 8 : Input difference between advanced and traditional farms of Madhya Pradesh

(Per ha)

Crops		Advance farms		Traditional farms		Difference	
		(a)		(b)		(a-b)	
		Operation wise	Source wise	Operation wise	Source wise	Operation wise	Source wise
Paddy	MJ	5772	17221	3978	9917	1794	7384
	C	4638	6329	2843	3836	1795	2493
Soybean	MJ	4092	10281	2580	4910	1512	5371
	C	3102	4896	2021	3030	1081	1846
Jowar	MJ	4240	9803	2612	4206	1628	5597
	C	3175	4116	2257	2594	918	1522
Wheat	MJ	11450	21316	8347	12994	3103	8322
	C	3660	5402	2781	3744	879	1658
Gram	MJ	3106	6855	1719	4099	1387	2756
	C	1696	3011	1169	2185	527	826
Sugarcane	MJ	14114	39049	9623	24232	4491	14817
	C	8835	12290	6202	7960	2633	4330

MJ = Energy requirements in Mega Joule/ha

C = Cost requirements in Rs/ha.

Table 9 : Output, difference between advanced and traditional farms of Madhya Pradesh

Crops	Advanced farms		Traditional farms		Difference	
	(a)		(b)		(a-b)	
	Yield	Gross return	Yield	Gross return	Yield	Gross return
	(q/ha)	(Rs/ha)	(q/ha)	(Rs/ha)	(q/ha)	(Rs/ha)
Paddy	42.00	8820	28.08	4618	17.92	4202
Soybean	15.00	8250	7.39	3883	7.61	4367
Jowar	25.00	5000	9.80	1904	15.20	3096
Wheat	40.00	13200	26.00	7073	14.00	6127
Gram	15.00	79.00	11.01	6270	3.99	1630
Sugarcane	750.00	23625	305.80	9467	444.20	14158

below those of advanced technology. The sourcewise difference in energy use was found to be highest in case of sugarcane (14817 MJ/ha) and it was lowest in case of gram (2756 MJ/ha).

The difference in the levels of energy use between traditional and advanced technology is clearly reflected in the productivity of crops and their gross return per hectare. As shown in Table 9 the yield gap between traditional and advanced technology was highest in case of sugarcane (444.20 q/ha) followed by paddy (17.92 q/ha), jowar (15.20 q/ha), wheat (14.0 q/ha), and soybean (7.61 q/ha). The yield difference was lowest for gram (3.99 q/ha) because of the closeness between traditional and advance technology already adopted by the farmers.

The yield gap and differential value productivity per hectare of crops can also be interpreted in terms of energy allocation among different crops under the condition of constrained and expanded supplies of energy in the farm sector. Looking into the importance of crops in terms of their acreage, production and consumption, the yield gaps exhibited by paddy, wheat and gram, become crucial for increased energy allocation both in terms of operations and material inputs involved in production process. If it is not taken care of, the yield gap will persist and the farm sector will suffer for want of adequate recommended energy levels.

Tables 10 and 11 present the percentage renewable and non-renewable energy and cost use efficiency for production of major crops under advanced and traditional farms of Madhya Pradesh. The overall renewable energy use efficiency was higher (58.58 per cent) on traditional farms than on advanced farms (43.24 per cent). The overall average non-renewable energy use efficiency was higher on advanced farms (56.76 per cent) than on traditional farms (41.42 per cent)

Table 10 : Percentage renewable and non-renewable energy and cost use efficiency for production of major crops under advanced farms of Madhya Pradesh

(Per ha)

Crops		Percentage renewable energy & cost use efficiency						Percentage non-renewable energy & cost use efficiency					
		Human	Animal	Seeds	F.Y.M.	Total	Diesel	Electricity	Fertilizers	Chemical	Machinery	Total	GrandTotal
Paddy	MJ	12.70	10.89	8.53	17.42	49.54	6.45	3.46	38.38	0.69	1.48	50.46	100.00
	C	48.93	17.63	2.65	6.32	75.53	5.68	1.02	13.55	3.16	1.06	24.47	100.00
Soybean	MJ	12.10	14.59	14.29	23.34	64.32	7.24	5.90	19.45	0.87	2.22	35.68	100.00
	C	35.82	19.36	16.33	6.53	78.04	4.90	3.06	10.70	1.83	1.27	21.96	100.00
Jowar	MJ	12.20	20.89	1.19	12.24	46.52	7.59	2.56	40.80	0.20	2.33	53.48	100.00
	C	38.31	31.04	1.94	3.88	75.17	5.03	1.94	13.16	2.42	1.48	24.83	100.00
Wheat	MJ	5.51	4.73	6.89	5.62	22.75	4.71	33.74	31.69	0.46	1.65	77.25	100.00
	C	29.52	11.10	7.40	2.96	50.98	5.83	21.28	17.21	0.55	4.15	49.02	100.00
Gram	MJ	8.35	12.66	16.07	-	37.08	9.23	15.05	31.59	3.64	3.41	62.92	100.00
	C	26.40	17.13	19.92	-	63.45	6.97	5.81	17.00	2.49	4.28	36.55	100.00
Sugarcane	MJ	10.00	8.66	14.85	5.76	39.27	6.20	11.27	40.97	0.92	1.37	60.73	100.00
	C	44.79	16.38	2.44	2.44	66.05	6.83	3.90	15.58	4.88	2.76	33.95	100.00
Overall Average	MJ	10.14	12.07	10.30	10.73	43.24	6.90	12.85	33.81	1.13	2.07	56.76	100.00
	C	37.29	18.79	8.44	3.68	68.20	6.00	6.20	14.55	2.55	2.50	31.80	100.00

MJ = Percentage energy requirement/ha
C = Percentage cost requirement/ha

Table 11 : Percentage renewable and non-renewable energy and cost use efficiency for production of major crops under traditional Farms of Madhya Pradesh

100

(Per ha)

Crops	Units	Percentage renewable energy & cost use efficiency					Percentage non-renewable energy & cost use efficiency						Grand Total
		Human	Animal	Seeds	F.Y.M.	Total	Diesel	Electricity	Fertilizers	Chemical	Machinery	Total	
Paddy	MJ	17.30	14.60	11.03	27.24	70.17	6.93	1.27	19.61	0.30	1.72	29.83	100.00
	C	43.66	22.62	4.45	12.77	83.50	6.17	1.64	6.41	0.99	1.29	16.50	100.00
Soybean	MJ	19.63	21.01	29.14	2.97	72.75	6.63	5.25	12.48	0.30	2.59	27.25	100.00
	C	34.95	24.91	25.54	1.08	86.48	4.03	2.36	5.40	0.72	1.01	13.52	100.00
Jowar	MJ	21.01	30.19	3.04	2.94	57.18	7.41	3.47	27.91	0.61	3.42	42.82	100.00
	C	40.24	40.13	2.35	0.80	83.52	5.01	1.61	6.05	2.50	1.31	16.48	100.00
Wheat	MJ	7.31	7.38	13.49	3.00	31.18	3.44	46.09	17.52	0.02	1.75	86.82	100.00
	C	29.56	19.63	11.64	2.27	63.10	4.51	20.56	8.14	0.03	3.64	36.90	100.00
Gram	MJ	10.75	15.24	36.67	—	62.36	7.44	8.48	18.49	0.51	2.72	37.64	100.00
	C	22.92	22.05	34.82	—	79.79	5.40	3.11	8.42	0.32	2.96	20.21	100.00
Sugarcane	MJ	11.34	11.31	27.47	7.73	32.85	4.46	12.57	23.46	0.25	1.41	42.15	100.00
	C	40.87	26.99	4.32	5.48	77.66	5.86	4.17	8.73	0.97	2.61	22.34	100.00
Overall	MJ	14.55	16.62	20.09	7.32	58.58	6.05	12.85	19.92	0.33	2.26	41.42	
	C	35.36	26.05	13.86	3.73	79.00	5.16	5.57	7.19	0.94	2.13	21.00	

MJ = Percentage Mega Joules energy consumption/ha

C = Percentage cost consumption/ha

Appendix : Energy and cost value of various agricultural inputs and outputs

Items	Unit	Equivalent energy (MJ)	Rs/hr/kg/1/kwh.
1. Human Labour			
(a) Male	man-hr	1.96	2.35
(b) female	Female-hr	1.57	1.50
2. Bullock	Pair-hr	10.10	7.67
3. Diesel	l	56.31	4.50
4. Electricity	Kwh.	11.93	0.50
5. Fertilizer			
(a) Nitrogen	kg	60.00	5.60
(b) P ₂ O ₅	kg	11.10	6.20
(c) K ₂ O	kg	6.70	2.10
6. Farm Yard manure	kg	0.30	0.60
7. Chemical			
(a) Superior	l	120.00	200.00
(b) Inferior	kg	10.00	3.00
not needing dilution			
8. Farm machinery	kg	62.70	û
9. Paddy	kg	14.70	1.70
10. Soybean	kg	14.70	4.50
11. Jowar	kg	14.50	1.50
12. Wheat	kg	14.70	3.00
13. Gram	kg	14.70	5.50
14. Sugarcane	kg	15.10	.30

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