

APPENDIX

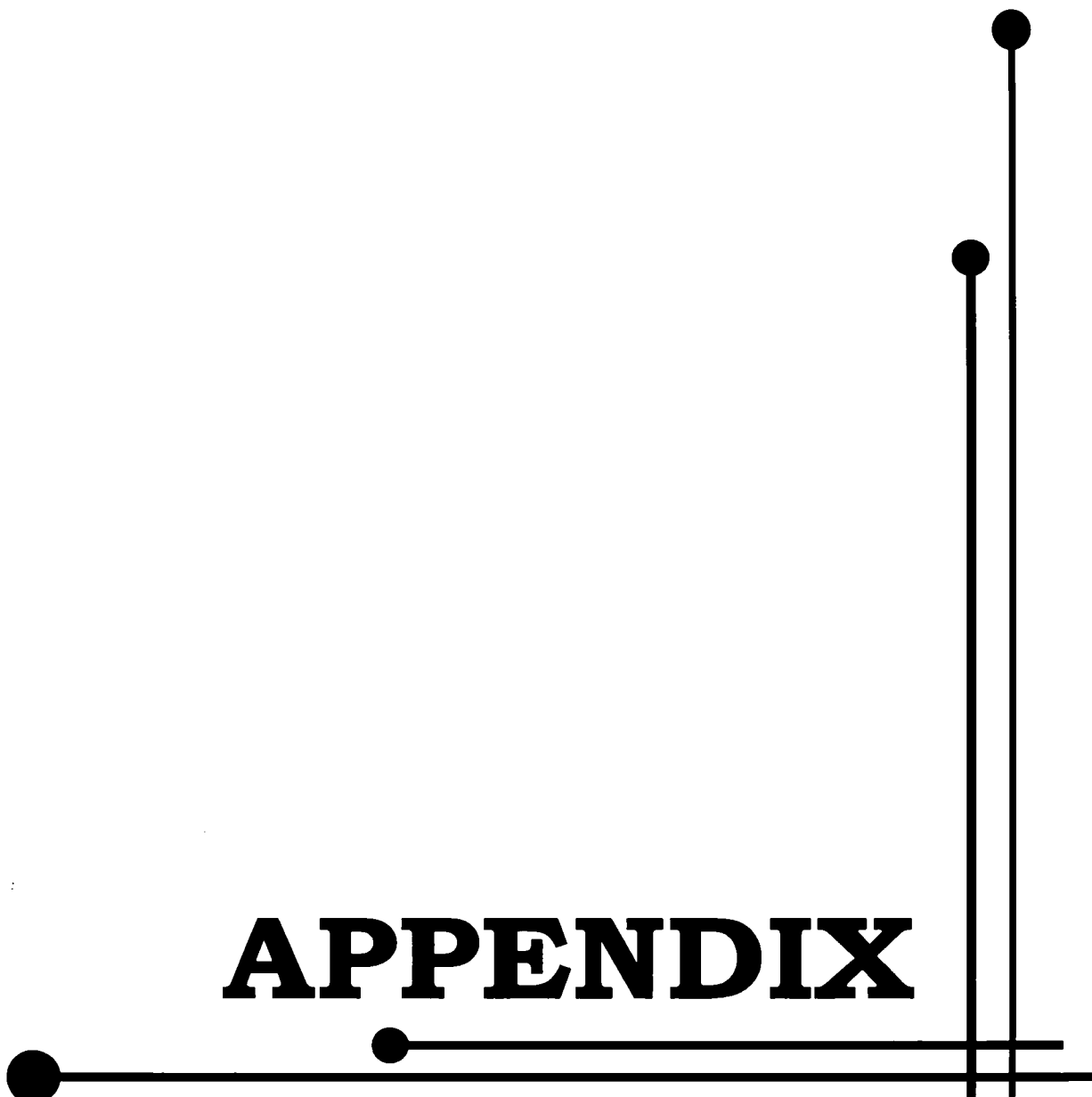


Table 1:
Working Heart rate (beats/min) of women subjects
on operation of different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	109.48	97.6	107.32	104.8
	W2	112.5	102	104.48	106.33
	W3	109.24	100.04	107.16	105.48
	W4	114.36	100.4	106.48	107.08
	W5	107.08	87.6	92.04	95.57
S2	W1	137.2	132.84	139.64	136.56
	W2	131.96	131.36	134.28	132.53
	W3	127.28	125.24	137.28	129.93
	W4	108.84	117.2	103.12	109.72
	W5	110.32	115.04	118.24	114.53
S3	W1	121.92	130	132.84	128.25
	W2	114.48	120.64	110.24	115.12
	W3	114.35	113.84	98.16	108.78
	W4	109.84	111.48	108.88	110.07
	W5	105.68	100.16	94.56	100.13
S4	W1	112.92	111.8	94.6	106.44
	W2	113.08	112.72	109.24	111.68
	W3	124.32	116.6	103.92	114.95
	W4	111.6	110.04	108.04	109.89
	W5	97.48	94.8	91.76	94.68
S5	W1	157.8	151	149.48	152.76
	W2	147.4	130.04	130.08	135.84
	W3	139.48	138.84	140.48	139.6
	W4	135.84	129.56	129.76	131.72
	W5	135.4	132.32	131.08	132.93
S6	W1	156.28	160.32	153.84	156.81
	W2	131.48	145.2	136.72	137.8
	W3	141.64	154.36	144.48	146.83
	W4	133.92	132.04	129.96	131.97
	W5	124.88	121.64	123.76	123.43
S7	W1	152.6	146.24	156.76	151.87
	W2	144.08	160.68	144.64	149.8
	W3	141.24	133.8	126.64	133.89
	W4	156.36	147.48	150.4	151.41
	W5	123.32	138.52	126.88	129.57
S8	W1	169.52	142.76	142.56	151.61
	W2	142.84	133.76	141.72	139.44
	W3	144.25	140.84	144.12	143.07
	W4	138.68	140.36	144.28	141.11
	W5	121.16	119.08	119.64	119.96

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 2:
Resting heart rate (beats/min) of women subjects

Main treatment	Subplot treatment	R1	R2	R3	
S1	W1	73	71.8	71.4	72.07
	W2	74.6	73.4	70	72.67
	W3	74.2	74.4	74.6	74.4
	W4	71.6	69.6	72.6	71.27
	W5	72.6	70.6	71.6	71.6
S2	W1	71.6	76.4	77.4	75.13
	W2	78.4	78	80.2	78.87
	W3	81.2	80	81.6	80.93
	W4	77.2	81.6	75	77.93
	W5	73.2	81	87	80.4
S3	W1	77	78.4	76.6	77.33
	W2	82.8	92.2	83.4	86.13
	W3	87	83.6	79.2	83.27
	W4	78.8	82.6	75.4	78.93
	W5	80.2	91.2	76	82.47
S4	W1	69	69.8	72.2	70.33
	W2	71.8	72.6	71.6	72
	W3	75	71.6	70.2	72.27
	W4	74.2	70.4	72.2	72.27
	W5	75	76	72	74.33
S5	W1	86.8	90.8	89.8	89.13
	W2	83.8	87.8	89.4	87
	W3	93.4	91.8	88.4	91.2
	W4	86.6	87.6	85.8	86.67
	W5	88	89.6	86.2	87.93
S6	W1	103	93.6	88.4	95
	W2	89.4	88.4	89.6	89.13
	W3	87.8	89	87.4	88.07
	W4	89	86.2	89.8	88.33
	W5	87	88.6	89.2	88.27
S7	W1	87.4	89	89	88.47
	W2	86.8	87.4	86	86.73
	W3	86.6	85.8	83.2	85.2
	W4	92.2	87.6	90.4	90.07
	W5	87.4	93.2	86.8	89.13
S8	W1	85	89.6	81.8	85.47
	W2	91	87	86.2	88.07
	W3	87.4	85.6	90	87.67
	W4	73.6	88.8	88.4	83.6
	W5	89	83.2	83	85.97

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,
W₅=Khutti

Table 2:
Increase in heart rate (Δ HR beats/min) of women subjects during
operation of different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	36.48	25.8	35.92	32.73
	W2	37.9	28.6	34.48	33.66
	W3	35.04	25.64	32.56	31.08
	W4	42.76	30.8	33.88	35.81
	W5	34.48	17	20.44	23.97
S2	W1	65.6	56.44	62.24	61.43
	W2	53.56	53.36	54.08	53.67
	W3	46.08	45.24	55.68	49
	W4	31.64	35.6	28.12	31.79
	W5	37.12	34.04	31.24	34.13
S3	W1	44.92	51.6	56.24	50.92
	W2	31.68	28.44	26.84	28.99
	W3	27.35	30.24	18.96	25.52
	W4	31.04	28.88	33.48	31.13
	W5	25.48	8.96	18.56	17.67
S4	W1	43.92	42	22.4	36.11
	W2	41.28	40.12	37.64	39.68
	W3	49.32	45	33.72	42.68
	W4	37.4	39.64	35.84	37.63
	W5	22.48	18.8	19.76	20.35
S5	W1	71	60.2	59.68	63.63
	W2	63.6	42.24	40.68	48.84
	W3	46.08	47.04	52.08	48.4
	W4	49.24	41.96	43.96	45.05
	W5	47.4	42.72	44.88	45
S6	W1	53.28	66.72	65.44	61.81
	W2	42.08	56.8	47.12	48.67
	W3	53.84	65.36	57.08	58.76
	W4	44.92	45.84	40.16	43.64
	W5	37.88	33.04	34.56	35.16
S7	W1	65.2	57.24	67.76	63.4
	W2	57.28	73.28	58.64	63.07
	W3	54.64	48	43.44	48.69
	W4	64.16	59.88	60	61.35
	W5	35.92	45.32	40.08	40.44
S8	W1	84.52	53.16	60.76	66.15
	W2	51.84	46.76	55.52	51.37
	W3	57	55.24	54.12	55.45
	W4	65.08	51.56	55.88	57.51
	W5	32.16	35.88	36.64	34.89

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,

W₅=Khutti

Table 3:
Recovery heart rate (beats/min) of women subjects
after operation with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	74.8	76.6	81	80.33
	W2	76.33	75.2	76.53	78.18
	W3	82.47	74.87	75.73	79.4
	W4	77.8	75.91	76.7	80.07
	W5	73.33	73.8	77.2	78.37
S2	W1	83.07	82.13	92.9	87.71
	W2	89	84.8	91.2	84.39
	W3	84.6	85.5	90.8	84.1
	W4	87.83	85.2	84.4	83.1
	W5	83.38	84.33	87.2	82.31
S3	W1	82.8	89.36	88.47	84.41
	W2	87.6	92.5	83.5	92.51
	W3	87.6	83.8	79.6	87.51
	W4	84.12	92.87	77.33	89.21
	W5	88.1	91.6	78.25	88.91
S4	W1	77.17	76.8	72.67	81.38
	W2	76	76.33	72.38	86.36
	W3	79.7	77	72.7	79.82
	W4	75.4	77.4	75.57	82.14
	W5	75.4	76.6	73.2	81
S5	W1	101.53	102.6	96.13	96.15
	W2	99.14	99.57	96.75	98.24
	W3	97.43	101	95.6	97.2
	W4	96.87	95.75	95.87	95.37
	W5	94.67	98.3	95	97.07
S6	W1	110.38	106	96.6	100.11
	W2	89.75	89.83	90.5	96.89
	W3	93.45	96.27	91.27	95.51
	W4	93.2	90.67	91.89	93.29
	W5	89.73	92.6	91.83	91.57
S7	W1	98.4	93.67	97.12	93.35
	W2	95	93.9	104.82	66.24
	W3	94.5	90.9	96	62.3
	W4	97.91	96.09	100.54	65.54
	W5	97.73	94.73	92.69	62.47
S8	W1	110.33	90.33	92.4	60.91
	W2	99	99.2	94.1	64.43
	W3	97.3	95.7	90.42	62.04
	W4	90.27	90.13	89.8	59.1
	W5	89.27	85.75	85.43	57.06

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,
W₅=Khutti

Table 4:
Increase in heart beats per metre square of area weeded (beats/m²)

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	14.39	14.23	17.88	15.5
	W2	41.19	42.5	46.07	43.25
	W3	62.2	54.36	49.23	55.26
	W4	49.38	44.77	47.1	47.08
	W5	67.08	56.67	53.04	58.93
S2	W1	31.47	27.94	31.46	30.29
	W2	74.73	71.72	73.61	73.35
	W3	48.86	54.31	54.3	52.49
	W4	30.73	32.7	29.96	31.13
	W5	98.64	91.5	69.1	86.41
S3	W1	18.02	24	27.59	23.2
	W2	23.07	22.14	27.33	24.18
	W3	49.31	44.78	35.11	43.07
	W4	47.75	47.29	45.02	46.69
	W5	68.93	28.66	49.85	49.15
S4	W1	15.08	18.86	11.23	15.06
	W2	65.59	59.73	58.84	61.39
	W3	42.65	41.28	33.92	39.28
	W4	42.18	47.3	46.22	45.23
	W5	74.52	64.53	85.79	74.95
S5	W1	21.93	25.25	27.28	24.82
	W2	57.69	48	48.64	51.44
	W3	50.67	45.89	43.76	46.77
	W4	56.77	67.24	61.11	61.71
	W5	90.69	88.39	83.94	87.67
S6	W1	18.47	30.15	27.88	25.5
	W2	50.39	57.67	63.16	57.07
	W3	49.55	54.02	48.77	50.78
	W4	46.56	46.9	46.68	46.71
	W5	105.22	63.58	76.8	81.87
S7	W1	46.54	48.45	49.94	48.31
	W2	81.87	71.7	75.5	76.36
	W3	64.38	84.21	54.8	67.8
	W4	55.63	54.35	58.82	56.27
	W5	97.34	98.17	114.51	103.34
S8	W1	59.96	39.33	43.78	47.69
	W2	46.07	81.75	68.15	65.32
	W3	68.37	74.41	94.01	78.93
	W4	65.76	64.37	69.42	66.52
	W5	119.41	89.55	107.34	105.43

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 5:
Energy expenditure (kJ/min) during operation of different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	8.7	6.8	8.3	7.9
	W2	9.2	7.5	7.9	8.2
	W3	8.6	7.2	8.3	8
	W4	9.5	7.2	8.2	8.3
	W5	8.3	5.2	5.9	6.5
S2	W1	13.1	12.4	13.5	13
	W2	12.3	12.2	12.6	12.4
	W3	11.5	11.2	13.1	11.9
	W4	8.6	9.9	7.7	8.7
	W5	8.8	9.6	10.1	9.5
S3	W1	10.7	11.9	12.4	11.7
	W2	9.5	10.5	8.8	9.6
	W3	9.5	9.4	6.9	8.6
	W4	8.7	9	8.6	8.8
	W5	8.1	7.2	6.3	7.2
S4	W1	9.2	9	6.3	8.2
	W2	9.2	9.2	8.6	9
	W3	11	9.8	7.8	9.5
	W4	9	8.8	8.4	8.7
	W5	6.8	6.3	5.9	6.3
S5	W1	16.4	15.3	15	15.6
	W2	14.7	11.9	12	12.9
	W3	13.4	13.3	13.6	13.4
	W4	12.9	11.9	11.9	12.2
	W5	12.8	12.3	12.1	12.4
S6	W1	16.1	16.8	15.7	16.2
	W2	12.2	14.4	13	13.2
	W3	13.8	15.8	14.2	14.6
	W4	12.6	12.3	11.9	12.3
	W5	11.1	10.6	10.9	10.9
S7	W1	15.5	14.5	16.2	15.4
	W2	14.2	16.8	14.3	15.1
	W3	13.7	12.5	11.4	12.5
	W4	16.1	14.7	15.2	15.3
	W5	10.9	13.3	11.4	11.9
S8	W1	18.2	14	13.9	15.4
	W2	14	12.5	13.8	13.4
	W3	14.2	13.7	14.2	14
	W4	13.3	13.6	14.2	13.7
	W5	10.5	10.2	10.3	10.3

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 6:
Percentage increase in energy expenditure(kJ/min) during operation of
different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	200	151.8	219	190.27
	W2	196.8	158.6	229.2	194.9
	W3	186.7	132.2	167.7	162.2
	W4	251.8	213	192.8	219.2
	W5	196.4	108	118.5	141
S2	W1	385.2	264.7	275	308.3
	W2	232.4	229.7	215	225.7
	W3	173.8	180	211.9	188.6
	W4	145.7	135.7	140.6	140.7
	W5	203.4	128.6	98	143.3
S3	W1	205.7	221.6	264.7	230.7
	W2	115.9	78	95.5	96.5
	W3	86.3	104.3	76.9	89.2
	W4	128.9	104.5	160.6	131.3
	W5	102.5	24.1	85.3	70.6
S4	W1	318.2	275	133.3	242.2
	W2	240.7	228.6	218.5	229.3
	W3	243.7	263	225	242.9
	W4	190.3	252	211.1	217.8
	W5	112.5	90.9	118.5	107.3
S5	W1	221.6	168.4	172.7	187.6
	W2	219.6	128.8	118.2	155.5
	W3	119.7	125.4	156.6	133.9
	W4	158	128.8	142.8	143.2
	W5	141.5	123.6	142	135.7
S6	W1	111.8	171	196.2	159.7
	W2	121.8	171.7	136.4	143.3
	W3	165.4	192.6	173.1	177
	W4	133.3	146	116.4	131.9
	W5	117.6	96.3	98.2	104
S7	W1	198.1	168.5	200	188.9
	W2	178.4	223.1	191.8	197.8
	W3	174	155.1	153.3	160.8
	W4	172.9	182.7	171.4	175.7
	W5	109.6	118	123.5	117
S8	W1	279.2	154.5	223.2	219
	W2	145.6	145.1	176	155.6
	W3	173.1	179.6	153.6	168.8
	W4	343.3	151.8	167.9	221
	W5	94.4	126.7	128.9	116.7

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 7:
Area covered (m²/hour) by women subjects on operation
with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	152.12	108.76	120.56	127.15
	W2	55.2	40.38	44.9	46.83
	W3	33.8	28.3	39.68	33.93
	W4	51.96	41.28	43.16	45.47
	W5	30.84	18	23.12	23.99
S2	W1	125.06	121.18	118.7	121.65
	W2	43	44.64	44.08	43.91
	W3	56.58	49.98	61.52	56.03
	W4	61.78	65.32	56.32	61.14
	W5	28.58	23.2	26.78	24.19
S3	W1	149.56	129	122.28	133.61
	W2	82.38	77.08	58.92	72.79
	W3	33.28	40.52	32.4	35.4
	W4	39	36.64	44.62	40.09
	W5	22.18	18.76	22.34	21.09
S4	W1	174.7	133.6	119.72	142.67
	W2	37.76	40.3	18.38	38.81
	W3	69.38	65.4	59.64	64.81
	W4	53.2	50.28	46.52	50
	W5	18.1	17.48	13.82	16.47
S5	W1	194.24	143.04	131.24	156.17
	W2	66.14	52.8	50.18	56.37
	W3	54.56	61.5	71.4	62.49
	W4	52.04	37.44	43.16	44.21
	W5	31.36	29	32.08	30.81
S6	W1	173.06	132.76	140.82	148.88
	W2	50.1	59.1	44.76	51.32
	W3	65.2	72.6	70.22	69.34
	W4	57.88	58.64	51.62	56.05
	W5	21.6	31.18	27	26.59
S7	W1	84.06	70.88	81.4	78.78
	W2	41.98	37.32	61.32	46.87
	W3	50.92	34.2	47.56	44.23
	W4	69.2	66.1	61.2	65.5
	W5	22.14	27.7	21	23.61
S8	W1	84.58	81.1	83.26	82.98
	W2	67.52	34.32	48.88	50.24
	W3	50.02	44.54	34.54	43.03
	W4	59.38	48.06	48.3	51.91
	W5	16.16	24.04	20.48	20.23

S=subject
W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 8:
Area covered (m²) by women subjects on operation with
different weeders in thirty minutes trial

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	54.38	76.06	60.28	63.57
	W2	27.6	20.19	22.45	23.41
	W3	16.9	14.15	19.84	16.96
	W4	25.98	20.64	21.58	22.73
	W5	15.42	9	11.56	11.99
S2	W1	62.53	60.59	59.35	60.82
	W2	21.5	22.32	22.04	21.95
	W3	28.29	24.99	30.76	28.01
	W4	30.89	32.66	28.16	30.57
	W5	11.29	11.6	13.39	12.09
S3	W1	74.78	64.5	61.14	66.81
	W2	41.19	38.54	29.46	36.4
	W3	16.64	20.26	16.2	17.7
	W4	19.5	18.32	22.31	20.04
	W5	11.09	9.38	11.17	10.55
S4	W1	87.35	66.8	59.86	71.34
	W2	18.88	20.15	19.19	19.41
	W3	34.69	32.7	29.82	32.4
	W4	26.6	25.14	23.26	25
	W5	9.05	8.74	6.91	8.23
S5	W1	97.12	71.52	65.62	78.09
	W2	33.07	26.4	25.09	28.19
	W3	27.28	30.75	35.7	31.24
	W4	26.02	18.72	21.58	22.11
	W5	15.68	14.5	16.04	15.41
S6	W1	86.53	66.38	70.41	74.44
	W2	25.05	29.55	22.38	25.66
	W3	32.6	36.3	35.11	34.67
	W4	28.94	29.32	25.81	28.02
	W5	10.8	15.59	13.5	13.3
S7	W1	42.03	35.44	40.7	39.39
	W2	20.99	18.66	30.66	23.44
	W3	25.46	17.1	23.78	22.11
	W4	34.6	33.05	30.6	32.75
	W5	11.07	13.85	10.5	11.81
S8	W1	42.29	40.55	41.63	41.49
	W2	33.76	17.16	24.44	25.12
	W3	25.01	22.27	17.27	21.52
	W4	29.69	24.03	24.15	25.96
	W5	8.08	12.02	10.24	10.11

Table 9:
Total cardiac cost of (beats/min) weeding with various weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	1148.4	918	1365.6	1144
	W2	1188.9	912	1230.3	1110.4
	W3	1299.3	783.3	1010.7	1031.1
	W4	1468.8	1113.3	1139.4	1240.5
	W5	1056.3	606	781.2	814.5
S2	W1	2312.1	1865.1	2332.2	2169.8
	W2	1924.8	1804.8	1952.4	1894
	W3	1484.4	1522.2	1946.4	1651
	W4	1268.1	1176	1125.6	1189.9
	W5	1419	1121.1	943.2	1161.1
S3	W1	1521.6	1876.8	2043.3	1813.9
	W2	1094.4	862.2	808.2	921.6
	W3	838.5	913.2	580.8	777.5
	W4	1090.8	1174.5	1062.3	1109.2
	W5	1001.4	280.8	624.3	635.5
S4	W1	1562.7	1470	686.1	1239.6
	W2	1364.4	1315.5	1152.6	1277.5
	W3	1620.6	1512	1086.6	1406.4
	W4	1158	1399.2	1176.3	1244.5
	W5	686.4	582	628.8	632.4
S5	W1	2571.9	2160	1980.3	2237.4
	W2	2368.2	1620.3	1440.9	1809.8
	W3	1503.3	1687.2	1778.4	1656.3
	W4	1785.3	1503.3	1620.9	1636.5
	W5	1622.1	1542.6	1610.4	1591.7
S6	W1	1819.8	2373.6	2209.2	2134.2
	W2	1272.9	1746.9	1440.6	1486.8
	W3	1784.7	2178.9	1828.5	1930.7
	W4	1473.6	1509.3	1267.5	1416.8
	W5	1218.3	1111.2	1115.7	1148.4
S7	W1	2286	1857.3	2276.4	2139.9
	W2	1964.4	2393.4	2323.8	2227.2
	W3	1876.2	1593	1687.2	1718.8
	W4	2096.1	2051.1	2104.2	2083.8
	W5	1387.5	1405.5	1379.1	1390.7
S8	W1	3295.5	1616.7	2140.8	2351
	W2	1795.2	1768.8	1902.6	1822.2
	W3	2007	1960.2	1636.2	1867.8
	W4	2452.5	1586.7	1718.4	1919.2
	W5	972.9	1152.9	1172.1	1099.3

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 10:
Percentage reduction in grip strength of left hand on
operation with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	30	16.7	9.1	18.6
	W2	11.11	9.1	11.1	10.4
	W3	9.1	46.1	16.7	24
	W4	11.1	8.3	9.1	9.5
	W5	14.3	20	11.1	15.1
S2	W1	12.5	18.18	5.9	12.2
	W2	22.2	8.3	6.7	12.4
	W3	20	18.2	25	21.1
	W4	11.1	10	11.1	10.7
	W5	28.6	12.5	20	20.4
S3	W1	5.3	14.3	6.2	8.6
	W2	6.7	6.7	18.2	10.5
	W3	7.1	18.2	20	15.1
	W4	7.7	14.3	9.1	10.4
	W5	6.7	6.2	11.1	8
S4	W1	13.3	12.5	16.7	14.2
	W2	7.1	13.3	6.2	8.9
	W3	7.1	21.4	14.3	14.3
	W4	7.7	12.5	16.7	12.3
	W5	7.1	7.7	6.7	7.2
S5	W1	13.3	10	12.5	11.9
	W2	10	20	22.2	17.4
	W3	25	10	10	15
	W4	11.1	11.1	10	10.7
	W5	7.7	6.7	12.5	9
S6	W1	9.1	10	14.3	11.1
	W2	10	18.2	13.3	13.8
	W3	10	20	22.2	17.4
	W4	27.3	8.3	30	21.9
	W5	15.4	16.7	18.2	16.8
S7	W1	7.1	18.2	20	15.1
	W2	8.3	8.3	9.1	8.6
	W3	12.5	20	16.7	16.4
	W4	18.2	11.1	10	13.1
	W5	6.7	9.1	16.7	10.8
S8	W1	7.1	11.1	15.4	11.2
	W2	6.2	6.7	6.2	6.4
	W3	10.5	10	13.3	11.3
	W4	6.7	14.3	14.3	11.8
	W5	6.7	9.1	6.7	7.5

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table 11:
Percentage reduction in grip strength of right hand on operation
with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	15.4	33.3	14.3	21
	W2	50	26.7	25	33.9
	W3	13.3	37.5	26.7	25.8
	W4	50	21.4	30.8	34.1
	W5	29.4	36.4	40	35.3
S2	W1	20	33.3	26.7	26.7
	W2	18.2	30.8	37.5	28.8
	W3	33.3	23.1	20	25.5
	W4	11.1	8.3	20	13.1
	W5	20	18.2	36.4	24.9
S3	W1	5.9	31.2	35.3	24.1
	W2	31.2	5.9	23.1	20.1
	W3	6.7	15.4	25	15.7
	W4	35.7	37.5	21.4	31.5
	W5	29.4	20	9.1	19.5
S4	W1	29.4	21.4	14.3	21.7
	W2	25	31.2	21.4	25.9
	W3	25	46.1	30.8	34
	W4	33.3	23.5	23.1	26.6
	W5	6.7	23.5	18.7	16.3
S5	W1	20	30.8	40	30.3
	W2	9.1	30	20	19.7
	W3	33.3	25	30	29.4
	W4	41.7	40	45.4	42.4
	W5	35.7	14.3	11.1	20.4
S6	W1	18.7	33.3	23.5	25.2
	W2	36.4	28.6	31.2	32.1
	W3	16.7	20	18.2	18.3
	W4	26.7	11.8	20	19.5
	W5	25	12.5	25	20.8
S7	W1	13.3	33.3	8.3	18.3
	W2	7.7	7.1	16.7	10.5
	W3	18.2	27.3	21.4	22.3
	W4	23.1	20	9.1	17.4
	W5	7.1	15.4	23.1	15.2
S8	W1	13.3	9.1	33.3	18.6
	W2	11.8	18.7	17.6	16
	W3	22.2	36.4	12.5	23.7
	W4	18.7	20	26.7	21.8
	W5	5.9	16.7	7.1	9.9

S=subject
W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,
W₅=Khutti

Table12:
Percentage reduction in grip strength of both hands on
operation with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	21.7	25.9	12	19.9
	W2	34.8	19.2	19	24.3
	W3	11.5	41.4	22.2	25
	W4	33.3	15.4	20.8	23.2
	W5	22.6	28.6	26.3	25.8
S2	W1	16.7	26.1	15.6	19.5
	W2	20	20	22.6	20.9
	W3	27.3	20.8	22.2	23.4
	W4	11.1	9.1	15.8	12
	W5	23.5	15.8	28.6	22.6
S3	W1	5.5	23.3	21.2	16.7
	W2	19.3	6.2	20.8	15.4
	W3	6.9	16.7	22.7	15.4
	W4	22.2	26.7	16	21.6
	W5	18.7	12.9	10	13.9
S4	W1	21.9	16.7	15.4	18
	W2	16.7	22.6	13.3	17.5
	W3	16.7	33.3	22.2	24.1
	W4	21.4	18.2	20	19.9
	W5	6.9	16.7	12.9	12.2
S5	W1	16.7	21.7	27.8	22.1
	W2	9.5	25	21	18.5
	W3	29.4	18.2	20	22.5
	W4	28.6	26.3	28.6	27.8
	W5	22.2	10.3	11.8	14.8
S6	W1	14.8	22.7	19.3	18.9
	W2	23.8	24	22.6	23.5
	W3	13.6	20	20	17.9
	W4	26.9	10.3	24	20.4
	W5	20	14.3	22.2	18.8
S7	W1	10.3	26.1	13.6	16.7
	W2	8	7.7	13	9.6
	W3	15.8	23.8	19.2	19.6
	W4	20.8	15.8	9.5	15.4
	W5	6.9	12.5	20	13.1
S8	W1	10.3	10	25	15.1
	W2	9.1	12.9	12.1	11.4
	W3	16.2	23.8	12.9	17.6
	W4	12.9	17.2	20.7	16.9
	W5	6.2	13	6.9	8.7

S=subject
W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,
W₅=Khutti

Table13:
Postural stress in terms of % deviation in lower back

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	0.55	0.55	0.82	0.64
	W2	1.09	0.82	1.37	1.09
	W3	2.73	2.18	2.46	2.46
	W4	1.64	1.37	1.09	1.37
	W5	5.46	3.82	5.19	4.82
S2	W1	1.66	1.38	1.66	1.57
	W2	5.52	4.97	5.8	5.43
	W3	4.97	4.42	5.52	4.97
	W4	3.04	2.21	2.21	2.49
	W5	7.73	8.01	8.29	8.01
S3	W1	0.55	0.55	0.82	0.64
	W2	2.75	2.75	2.47	2.66
	W3	1.65	1.65	1.37	1.56
	W4	2.2	2.2	1.92	2.12
	W5	3.85	3.85	3.3	3.67
S4	W1	0.55	0.55	0.55	0.55
	W2	0.55	0.82	0.55	0.64
	W3	1.09	1.09	0.82	1
	W4	0.82	1.2	0.82	0.95
	W5	4.92	4.92	4.64	4.83
S5	W1	0.55	0.27	0.55	0.46
	W2	1.1	0.55	0.82	0.82
	W3	2.75	2.2	1.92	2.29
	W4	1.1	0.55	0.55	0.73
	W5	6.04	3.57	3.3	4.3
S6	W1	1.1	1.38	1.1	1.19
	W2	4.97	4.97	4.97	4.97
	W3	2.76	3.31	3.04	3.04
	W4	4.42	3.31	2.76	3.5
	W5	6.08	5.52	5.25	5.62
S7	W1	0.55	0.55	0.83	0.64
	W2	1.66	2.21	1.66	1.84
	W3	4.42	3.87	3.59	3.96
	W4	1.1	0.83	1.1	1.01
	W5	8.84	9.94	10.5	9.76
S8	W1	0.27	0.27	0	0.18
	W2	6.59	4.39	4.94	5.31
	W3	1.65	1.1	1.2	1.32
	W4	2.2	1.65	1.92	1.92
	W5	8.24	7.97	8.24	8.15

S=subject
W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,
W₅=Khutti

Table14: Postural stress in terms of % deviation in upper back

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	0.81	0.54	0.81	0.72
	W2	2.17	1.9	1.63	1.9
	W3	2.17	1.63	2.17	1.99
	W4	3.26	2.44	2.72	2.81
	W5	2.72	2.17	2.72	2.54
S2	W1	0.83	0.83	1.38	1.01
	W2	1.38	1.1	1.93	1.47
	W3	4.13	3.58	4.13	3.95
	W4	1.65	1.93	1.93	1.84
	W5	1.65	2.2	2.75	2.2
S3	W1	0	0.27	0.27	0.18
	W2	1.2	1.37	1.1	1.22
	W3	2.47	2.2	2.2	2.29
	W4	3.85	4.12	3.85	3.94
	W5	4.39	4.67	4.39	4.48
S4	W1	0.55	0.55	0.27	0.46
	W2	1.65	1.1	1.1	1.28
	W3	1.65	1.37	1.37	1.46
	W4	0.82	0.82	0.55	0.73
	W5	4.39	0.39	4.39	3.06
S5	W1	0.27	0.27	0.27	0.27
	W2	0.8	0.8	0.53	0.71
	W3	1.07	1.07	1.6	1.25
	W4	0.8	0.53	0.8	0.71
	W5	1.6	1.07	1.34	1.34
S6	W1	1.66	1.66	1.1	1.47
	W2	3.31	3.87	3.59	3.59
	W3	3.04	3.87	3.31	3.41
	W4	3.31	2.76	2.49	2.85
	W5	3.31	2.76	3.04	3.04
S7	W1	0.54	0.27	0.81	0.54
	W2	2.72	3.26	2.17	2.72
	W3	1.63	1.36	1.09	1.36
	W4	0.54	0.54	1.09	0.72
	W5	3.26	3.26	3.8	3.44
S8	W1	0.27	0	0.27	0.18
	W2	0.82	0.54	0.55	0.64
	W3	0.27	0.55	0.55	0.46
	W4	0.55	0.82	1.09	0.82
	W5	4.92	4.92	5.19	5.01

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,

W₅=Khutti

Table 15:
Overall Body discomfort felt on operation with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	5	4	5	4.67
	W2	5	5	5	5
	W3	5	4	5	4.67
	W4	4	5	6	5
	W5	4	4	4	4
S2	W1	5	5	5	5
	W2	5	5	5	5
	W3	6	6	5	5.67
	W4	6	5	6	5.67
	W5	4	5	4	4.33
S3	W1	5	6	5	5.33
	W2	5	5	5	5
	W3	5	5	5	5
	W4	4	4	4	4
	W5	5	5	5	5
S4	W1	5	6	5	5.33
	W2	6	6	5	5.67
	W3	6	7	7	6.67
	W4	5	5	5	5
	W5	4	4	4	4
S5	W1	7	7	7	7
	W2	6	6	6	6
	W3	6	7	6	6.33
	W4	5	6	5	5.33
	W5	5	5	5	5
S6	W1	7	6	6	6.33
	W2	6	6	6	6
	W3	6	6	6	6
	W4	6	5	5	5.33
	W5	5	5	5	5
S7	W1	7	6	7	6.67
	W2	6	5	5	5.33
	W3	6	5	5	5.33
	W4	5	5	5	5
	W5	4	4	4	4
S8	W1	8	7	7	7.33
	W2	7	6	6	6.33
	W3	6	5	5	5.33
	W4	6	6	5	5.67
	W5	5	4	4	4.33

S=subject

W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe, W₅=Khutti

Table16: Weeding efficiency with different weeders

Main treatment	Subplot treatment	R1	R2	R3	Mean
S1	W1	69.32	62.86	57.71	63.3
	W2	75.73	59.46	66.67	67.29
	W3	73.68	69.28	60.61	67.86
	W4	56.93	82.62	78.19	72.58
	W5	83.03	81.01	84.47	82.84
S2	W1	76.28	79.35	63.64	73.09
	W2	88.87	80.64	84.68	84.73
	W3	74.19	68.18	53.07	65.15
	W4	84.46	93.6	88.61	88.89
	W5	96.04	90.88	93.55	93.49
S3	W1	87.06	70.73	68.35	75.38
	W2	66.67	50.36	78.05	65.03
	W3	62.5	79.73	92.36	78.2
	W4	96	88	76.31	86.77
	W5	90	92.68	87.18	89.95
S4	W1	81.03	78.85	82.14	80.67
	W2	80.77	77.5	83.33	80.53
	W3	67.46	71.43	69.8	69.56
	W4	81.11	84.5	79.21	81.61
	W5	89.19	90.36	92.63	90.73
S5	W1	82.81	63.53	55.9	67.4
	W2	78.52	75.75	70.83	75.03
	W3	84.75	81.2	77.91	81.29
	W4	84.28	86.78	78.05	83.04
	W5	92.21	84.51	79.46	85.39
S6	W1	84.53	79.12	69.23	77.63
	W2	77.43	76.79	83.09	79.1
	W3	88.76	75.78	79.81	81.45
	W4	88.23	86.77	82.83	85.94
	W5	97.19	90	95.45	94.2
S7	W1	84.86	78.29	71.28	78.14
	W2	84.87	89.21	84.95	86.34
	W3	77.62	78.12	70.83	75.52
	W4	63.16	68.75	73.31	68.41
	W5	94.85	89.45	90.31	91.54
S8	W1	81.61	79.74	76.95	79.43
	W2	83.33	81.37	74.47	79.72
	W3	77	77.98	75.53	76.84
	W4	82.35	77.52	75.35	78.41
	W5	92.92	94	89.42	92.11

S=subject
W₁=Wheel hoe, W₂=Draw weeder, W₃=v-blade hoe, W₄=Falcon hoe,
W₅=Khutti

INTERVIEW SCHEDULE

Title: Ergonomic assessment of the available technologies for weeding activity performed by women.

Part – 1

Background Characteristics

- 1. Name of the village & Address _____
- 2. Name of the respondent _____
- 3. Age of the respondent (completed years) _____
- 4. Educational Qualification _____
 - a. Illiterate
 - b. Can read and write
 - c. Primary
 - d. Middle
 - e. Matric
 - f. Graduate
 - g. Post Graduate
 - h. Any other
- 5. Occupation
 - a. Housewife
 - b. Agricultural laborer
 - c. Any other
- 6. Monthly income, in case of working (Rs.) _____
- 7. Type of family: Nuclear / Joint
- 8. Family size

	M	F	Total
Children			
Adult			

- 9. Family Caste _____
- 10. Family Details _____
- 11. Total family income form all the source other than agriculture _____ Rs.
/ month

Part - II

12. Agriculture Details

- 1. Size of the Landholding (Canals)
- 2. Total area under cultivation
- 3. Land use pattern

	Agricultural crops		Horticultural crops		Pasture	Forest
	Irrigated	Unrelated	Irrigated	Unrelated		
Area						
Yield						
Income						
Pear year						

13. Details of Crops

Agriculture Seasons	Crops sown	Area under crop	Variety	Fertilizer	Other input	AVG Yield	Q/ha
Karif	Maize						
	Paddy						
	Mash						
	Soybean						
Rabi	Wheat						
	Potato						
	Gram						
	Mustard						
	Others						
Horticulture	Kinnow						
	Apple						
	Litchi						
	Others						

14 Details of Livestock

Type	Number	YIELD
Bullock		
Buffalo		
Cow		
Sheep		
Goat		
Poultry Birds		
Others		

15 Agricultural technology used.

- a. Tractor
- b. Thresher
- c. Weeder
- d. Any Other

Part – III

Information regarding weeding operation

Crops for which weeding is carried out

Name of the season	Name of the Crop	No. of times the weeding Operation is carried out

How many days after sowing/planting first weeding operation is performed.

Name of the season	Name of the crop	No. of days after sowing When first weeding operation is carried out

- 1) Since how many years you are performing weeding activity? _____
- 2) Name the traditional weeding tools used. _____
- 3) Do you use newly developed weeding tools? Yes / no.
If yes. Then what are those? _____

Name of the crop	Tool/Tools Used for Weeding		Posture / Postures Used for weeding	Time (minutes) for which weeding operation is carried out continuously without rest
	T	ND		

- 4) After how much time you take rest while performing weeding_____
- 5) What is the frequency if taking rest?
Once
Twice
Thrice
More Than thrice
Any other.
- 6) What is the duration of rest period?
5 Minutes
10 minutes

7) Do you talk while while weeding? Yes / no.

Sea son	crop	Frequency of Performance			BY	Children Resp.		In – laws		Other Family Members		
		After One Wee	After Two Wee	Any Othe mont		G	B	F-in Law	M- in Lav	Bro – in Law	Sis law	Any othe

8) How much total area you cover in a day's work?_____

Subjective assessment of the postural discomfort

How much body pain you feel at the end of the day with the traditional weeding tools

Name the body parts where you feel pain and the extent of discomfort felt in each of the body part named.

Discomfort felt

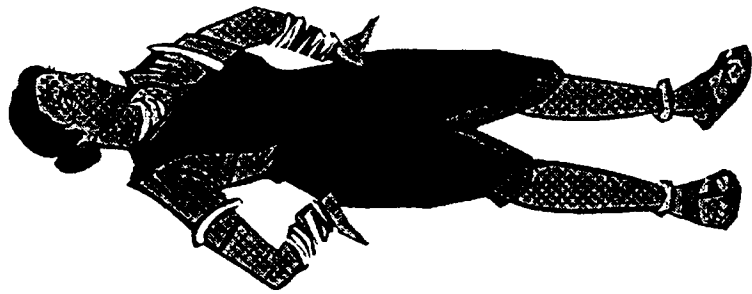
0	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No discomfort								extreme		
Discomfort										

Health status of the Respondents

- 1) How frequently do you fall ill
 - a) Once a month
 - b) Once in three months
 - c) Once in six months
 - d) Any other
- 2) Nature of sickness?
- 3) Have you ever suffered serious illness? If yes then what.

Anthropometric measurements of respondents

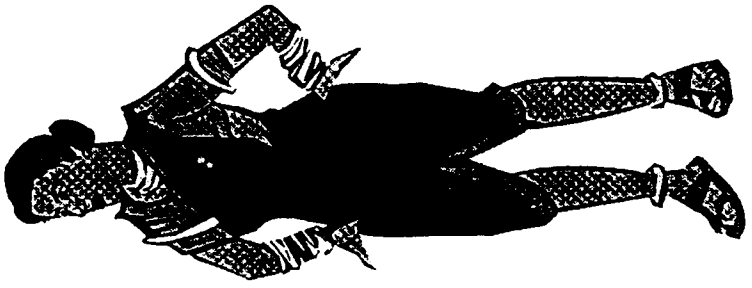
- 1) Weight
- 2) Stature
- 3) Sitting height
- 4) Elbow Height
- 5) Knee Height
- 6) Waist back length
- 7) Total arm length
- 8) Fore arm length
- 9) Hand length
- 10) Wrist breadth
- 11) Fore arm hand length
- 12) Hand breadth across thumb
- 13) Hand breadth at meta carpal-III
- 14) Palm Length
- 15) Waist height



No Discomfort

0	1	2	3	4	5	6	7	8	9	10
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Extreme Discomfort



VISUAL ANALOGOUS DISCOMFORT SCALE FOR ASSESSMENT OF OVERALL BODY DISCOMFORT¹
(0 – No Discomfort, 10 – Extremely Discomfort)