



Plate 1. Animal traction ripper (*yellow tine attached to a green conventional plough beam – left*) and Fitarell direct seeder (*red and yellow implement - right*) used at Kawalala and Hoya, and Kapara sites during experimentation, respectively.



Plate 2. Hand dug planting basins on the farmer's field before the onset of the rainy season

Supplementary Table 1. ANOVA for maize grain yield responses to the different treatments applied in the dibblestick, animal traction ripping and direct seeding cropping systems from 2012 to 2015.

CA system	Harvest year	Source	DF	SS	MS	F	P
Dibblestick	2012	Farmer	14	5674	1569	3.05	0.0396
		Treatment	3	1332	4049854		
		Error	40	5830	1328990		
	2013	Farmer	30	9877	3002307	4.45	0.0058
		Treatment	3	1317	4004754		
		Error	93	9188	900891		
	2014	Farmer	29	3100	3586509	2.59	0.0578
		Treatment	3	6977928	2325976		
		Error	87	8561	897314		
	2015	Farmer	15	10269	6241083	13.24	0.0000
		Treatment	3	1706	5188295		
		Error	45	1933	391761		
	Across years	Farmer	74	16520	7488641	5.89	0.0006
		Treatment	3	2231	6780710		
		Error	291	9986	1151307		
Ripper	2012	Farmer	5	8072	1614	0.55	0.5950
		Treatment	2	673109	336554		
		Error	10	6150787	615079		
	2013	Farmer	15	9021	5484200	10.08	0.0004
		Treatment	2	1332	6076820		
		Error	30	1984	602891		
	2014	Farmer	14	7424	4835520	0.79	0.4637
		Treatment	2	4423315	2211657		
		Error	28	8595	2799159		
	2015	Farmer	7	1866	2431617	17.00	0.0002
		Treatment	2	1252	5712054		
		Error	14	4705089	336078		
	Across years	Farmer	33	7184	7303849	5.77	0.0042
		Treatment	2	1832	8352738		
		Error	99	4269	1446550		
Direct seeder	2013	Farmer	6	8336217	1389369	6.10	0.0149
		Treatment	2	4120590	2060295		
		Error	12	4053206	337767		
	2014	Farmer	7	3958343	565478	4.97	0.0233
		Treatment	2	1156551	578275		
		Error	14	1627314	116237		
	2015	Farmer	3	216536	72179	99.30	0.0000
		Treatment	2	1203813	601907		
		Error	6	36370	6062		
	Across years	Farmer	17	3040	1631349	1.58	0.2187
Treatment		2	1042110	521055			
Error		37	1334	328894			

\*DF = degrees of freedom; ss = sum of squares; ms = mean square.