

Table 1. Survey sample sizes (households) for rice, sweetpotato, maize, peanuts, and vegetables, on the basis of whether farmers are renters/sharecroppers or owners of the cropped land in the three villages in East Java.

Crops	Blitar Togokan		Magetan Widorokandang		Malang Kenongo	
	Renter/ Sharecropper	Owner	Renter/ Sharecropper	Owner	Renter/ Sharecropper	Owner
Rice	21	53	29	68	10	73
Sweetpotato	10	33	25	46	6	43
Maize	12	46	2	6	--	22
Peanuts	0	14	--	--	--	--
Vegetable	--	--	1	3	4	14

Table 2. Number of flour-users who were interviewed, who received flour for trials, and who actually participated in the trials.

<b>Flour-users</b>	<b>Malang</b>	<b>Blitar</b>	<b>Magetan</b>
Interviewed	5	13	5
Received flour	3	13	1
Participated in trial	0	9	0

Table 3. General characteristics of demography, crop rotation patterns, and sweetpotato production in Togokan, Widorokandang, and Kenongo.

<b>Characteristics</b>	<b>Togokan Blitar</b>	<b>Widorokandang Magetan</b>	<b>Kenongo Malang</b>
<b>Crop Rotation Pattern</b>	Rice-SP <sup>a</sup> -Maize (46%) Rice-SP-Peanut (16%) .	Rice-SP-Maize (76%) Rice-Rice-Maize (11%)	Rice-SP (37%) Rice-Rice-Maize (22%) Rice-Maize-Rice (19%)
<b>Sweetpotato</b>			
1995 Area (ha/hh <sup>b</sup> )	.4	.4	.3
1996 Area Δ (ha/hh)	-.12 (-30%)	-.27 (-68%)	-.2 (-67%)
Harvest Season			
1 <sup>st</sup> Crop	Aug-Oct	Oct-Jan (Nov-Dec peak)	Jun-Aug
2 <sup>nd</sup> Crop	---	---	Sep-Jan (Oct-Dec peak)
Yield (T/ha)	≈ 15 - 20	16 (1995) 23 (most years)	29
Sales Method	<i>Tobasan</i>	<i>Tobasan</i> and per Kg	per Kg
<b>Demographics</b>			
Ave. Age (Head of hh)	52	46	49
Migration Destination	Malaysia	Jakarta	Negligible
Ag. Labor Supply	Shortage	Medium	Excess
Wage Level	High	Medium	Low

<sup>a</sup> Sweetpotato

<sup>b</sup> Household

Table 4. Costs and net profits of rice, sweetpotato, maize, peanut, and vegetable crops in three villages on the basis of whether farmers are renters/sharecroppers or owners of the cropped land (in Rupiah).

<b>Togokan, Blitar</b>						
	Renter/Sharecropper			Owner		
Crops	Cost/ ha	Profit/ ha	#HH	Cost/ ha	Profit/ ha	#HH
Rice	961,716	1,093,033	21	535,820	1,381,013	53
Sweetpotato	889,722	518,444	10	538,217	750,956	33
Maize	1,033,799	549,236	12	357,572	1,078,371	46
Peanut	--	--	--	562,433	1,263,068	14
<b>Widorokandang, Magetan</b>						
	Renter/Sharecropper			Owner		
Crops	Cost/ ha	Profit/ ha	#HH	Cost/ ha	Profit/ ha	#HH
Rice	932,252	565,627	29	355,658	972,749	68
Sweetpotato	1,131,396	56,854	25	542,591	863,474	46
Maize	661,222	847,601	2	328,648	721,691	6
Others	551,064	2,800,000	1	1,391,542	1,681,725	3
<b>Kenongo, Malang</b>						
	Renter/Sharecropper			Owner		
Crops	Cost/ ha	Profit/ ha	#HH	Cost/ ha	Profit/ ha	#HH
Rice	1,105,277	804,396	10	550,361	1,311,326	73
Sweetpotato	1,435,435	406,231	6	838,390	1,348,767	43
Maize	--	--	0	232,162	223,434	22
Others	1,369,333	-102,667	4	1,402,161	3,735,072	14

<sup>a</sup> All costs and profits are expressed in 000s Rp.

Table 5. Competitive threshold prices of sweetpotato roots and flour compared with maize, rice, and peanut (per ha) for various possible yields—Togokan.

<b>For those who rent or sharecrop</b>							
		SP Price Needed to Compete with Maize		SP Price Needed to Compete with Rice			
SP Yield (Ton/ha)	1995 SP Prices (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)		
15	94	96	384	132	529		
20	70	72	288	96	397		
25	56	58	230	79	317		
30	47	48	192	66	264		
<b>For those who cultivate their own land</b>							
		SP Price Needed to Compete with Maize		SP Price Needed to Compete with Rice		SP Price Needed to Compete with Peanut	
SP Yield	1995 SP Prices (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)
15	85	108	431	128	512	120	480
20	63	81	323	96	384	90	360
25	51	65	259	77	307	72	288
30	42	54	216	64	256	60	240

Table 6. Competitive threshold prices of sweetpotato roots and flour compared with maize, rice, and peanut (per ha) for various possible yields—Widorokandang.

<b>For those who rent or sharecrop</b>					
		SP Price Needed to Compete with Maize		SP Price Needed to Compete with Rice	
SP Yield (Ton/ha)	1995 SP Prices (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)
15	79	132	528	113	453
20	59	99	396	85	339
25	48	79	317	68	272
30	40	66	264	57	226
<b>For those who cultivate their own land</b>					
		SP Price Needed to Compete with Maize		SP Price Needed to Compete with Rice	
SP Yield	1995 SP Prices (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)	Root prices (Rp/kg)	Root price for flour (Rp/kg)
15	94	84	337	101	404
20	70	63	253	76	303
25	56	51	202	61	242
30	47	42	169	51	202

Table 7. The various features of sweetpotato processing trials in Togokan and Kenongo.

<b>Trial Features</b>	<b>Togokan Trial</b>	<b>Kenongo Trials</b>
# of trials	1	3
# kg of sweetpotato	39	2, 2, 9.5
Processing procedures	peel-wash-hand shred (dry)-carry out-spread-carry in-mill	peel-wash-hand shred (into water)-drain- carry out-spread-carry in-mill
Drying trays	metal sheets, bamboo mats	woven bamboo trays
Drying time (days)	2-3	1
Conversion rate (%)	19	17.5 - 20
Flour color	Yellow	White, yellowish, yellowish
Flour texture	Coarse	Fine, coarse

Table 8. Estimated processing costs for Togokan, Widorokandang, and Kenongo<sup>a</sup>, based on local wages.

Activity				Togokan		Widorokandang		Kenongo				
	Kg	Min	#P	Rp/kg	Rp/kg <sup>b</sup>	Rp/kg	Rp/kg <sup>b</sup>	Kg	Min	#P	Rp/kg	Rp/kg <sup>b</sup>
Get water								2	0.5	1	0.9	4
Peel	39	150	2	85.5	342	57	228	2	8.5	1	15.7	63
Wash	39	8	2	4.6	18	3	12	2	2.5	1	4.6	18
Shredding	100	10	1	1.1	4	0.7	3	2	17	1	0.3	1
Press <sup>c</sup>				7.4	30	4.9	20				2.0	8
Spread	39	5	2	2.8	11	1.9	7.6	2	2.5	1	4.6	18
Carry	39	12	2	6.8	27	4.6	18.4	2	1	1	1.9	8
Mill <sup>d</sup>				18.8	75	18.8	75				10.0	40
Total Labor				127.0	<b>508</b>	90.9	<b>364</b>				39.1	<b>156</b>

<sup>a</sup>Based on Rp10,000/person/45hr (45 hrs.=2700 minutes) in Kenongo, factory wage.

Based on Rp4,000/person/6hr (6 hrs.=360 minutes) in Togokan, agricultural labor wage.

Based on Rp4,000/person/9hr (9 hrs.=540 minutes) in Widorokandang, agricultural labor wage.

<sup>b</sup>Fresh root price for processing one kilo of flour.

<sup>c</sup>Shredding and press labor estimated from data supplied by an entrepreneur.

<sup>d</sup>Based on the charge at privately owned mills in each village.

Table 9. Summary of market survey of interviewed factories and home industries that may be potential sweetpotato flour-users, in Malang, Blitar, and Magetan districts.

<b>Area</b>	<b>Business</b>	<b>Products</b>	<b>Wheat flour use (kg/day)</b>	<b>Total cost (Rp/day)</b>
<b>Malang</b>	10 Home industries 1 Fresh noodle factory	Bread, cake, donuts, snacks, and fresh noodles	406	290,313
<b>Blitar</b>	9 Home industries 5 Dry noodle factories	Bread, cake, donuts, snacks, dry noodles	10,323	7,482,251
<b>Magetan</b>	3 Bakeries 2 Home industries	Bread, cake, snacks	1,241	906,054

Table 10. The potential savings from using composite flour for noodle factories of varying sizes.

	<b>Small</b>	<b>Medium</b>	<b>Large</b>
Daily flour consumption (kg/day)	186	2,250	6,000
25% substitution (kg/day)	46.5	562.5	1,500
Potential savings (Rp/day) <sup>a</sup>	11,625	140,625	375,000

<sup>a</sup>Based on savings of Rp250 per kilo of flour.

Table 11. Synthesis of production (fresh root cost), processing, and marketing potential for making sweetpotato flour in Togokan, Widorokandang, and Kenongo.

	<b>Togokan</b>	<b>Widorokandang</b>	<b>Kenongo</b>
Production potential (Rp)	232-800	204-588	296-360
Processing potential			
• processing cost (Rp)	508	364	156
• labor availability	low	med	high
• labor cost	high	med	low
• harvest season	mostly in dry season	coincides with wet season	may harvest year-round
• availability of water	need to pay for water	shortage of water	abundance of water
• sun-drying time	2 days	--	1 day
Marketing potential			
• price	25-30% cheaper	25-30% cheaper	25-30% cheaper
• color	absolutely white	absolutely white	absolutely white
• markets	A variety of home industries and noodle factories	A dominant bakery, limited home industries, and some noodle factories	Various scales of home industries, bakeries, and noodle factories

Table 12. The costs and potential profits of producing sweetpotato flour, based on flour prices of Rp560 and 650 per kg, in three villages.

<b>Togokan (Blitar)</b>										
	Farmer <sup>a</sup>	Renters/Sharecroppers				Owners				
		Rice <sup>b</sup>	Maize <sup>c</sup>	1993 <sup>d</sup>	1994 <sup>e</sup>	Farmer	Rice	Maize	1993	1994
Costs <sup>f</sup> (Rp)	752	317	230	240	1,000	800	308	260	240	1,000
Fresh root	508	508	508	508	508	508	508	508	508	508
Processing										
Profit (Rp)										
Price=560	-700	-265	-178	-188	-948	-748	-256	-208	-188	-948
Price=650	-610	-175	-88	-98	-858	-658	-166	-118	-98	-858
<b>Widorokandang (Magetan)</b>										
	Farmer	Renters/Sharecroppers			Owners					
		Rice	Maize		Farmer	Rice	Maize			
Costs <sup>f</sup> (Rp)	576	272	317		596	242	202			
Fresh root	364	364	364		364	364	364			
Processing										
Profit (Rp)										
Price=560	-380	-76	-121		-400	-46	-6			
Price=650	-290	14	-31		-310	44	84			
<b>Kenongo (Malang)</b>										
	Farmer	Renters/Sharecroppers			Farmer	Owners				
		Rice	Maize			1995 price	Maize+Rice			
Costs <sup>f</sup> (Rp)	368	Only 10% of farmers rent or sharecrop for SP in Kenongo; owners 1995 prices apply.			356	296	Maize+Rice SP already competitive at 1995 price			
Fresh root	156				156	156				
Processing										
Profit (Rp)										
Price=560	36				48	108				
Price=650	126				138	198				

<sup>a</sup> Average price demanded by farmers: based on the survey in which the respondents were asked at what stable

price they would be willing to sell their sweet potato for processing with a steady demand.

<sup>b</sup> The price at which sweetpotato would be competitive with rice, assuming yield=25 t/ha (see Tables 5 & 6).

<sup>c</sup> The price at which sweetpotato would be competitive with maize, assuming yield=25 t/ha (see Tables 5 & 6).

<sup>d</sup> The lowest sweetpotato price in Togokan during the last 10 years (see Figure 1).

<sup>e</sup> The highest sweetpotato price in Togokan during the last 10 years (see Figure 1).

<sup>f</sup> For processing costs for each village, see Table 8.

Table 13. The sociological and agronomic opportunities for processing in Kenongo

<b>Sociological</b>	<ul style="list-style-type: none"> <li>• Kenongo declared a <i>Desa Ter Tinggal</i>—a below-poverty-level village--by the government</li> <li>• Minimum out-migration resulting in low income, cheap labor, and low processing cost</li> <li>• Previous sweet potato chips home industry in the village</li> <li>• Existing women’s group with motivated, interested, and innovative women</li> <li>• An existing village-owned mill for processing</li> <li>• Close to the market of Malang</li> </ul>
<b>Agronomic</b>	<ul style="list-style-type: none"> <li>• Extensive irrigation system allowing year-round SP production and year-round supply of SP</li> <li>• Abundance of water for processing</li> <li>• High SP yields, low prices</li> <li>• Constant fluctuations of SP means cheap SP supply is always available (see Figure 2)</li> <li>• Hot and dry climate facilitating rapid drying</li> </ul>

Table 14. The cost and profit of one kilo of SP flour at 25%, 22%, and 20% conversion rates, assuming a market price of Rp650 kg<sup>-1</sup>.

Conversion rate (%)	Cost (Rp)	Profit (Rp)
25	500	150
22	568	82
20	625	25

Table 15. The volume and value of wheat imports in Indonesia and the potential decrease through 5% sweetpotato flour substitution.

Year	Import	
	1,000 mt	MLN US\$
1970	16	2
1975	717	67
1980	1,482	162
1985	1,317	259
1990	1,724	282
1991	2,222	366
1992	2,456	404
1993	2,526	442
1994	3,296	580
1995	4,054	803
Potential decrease	<b>203</b>	<b>40</b>

source: FAO Agristat Database