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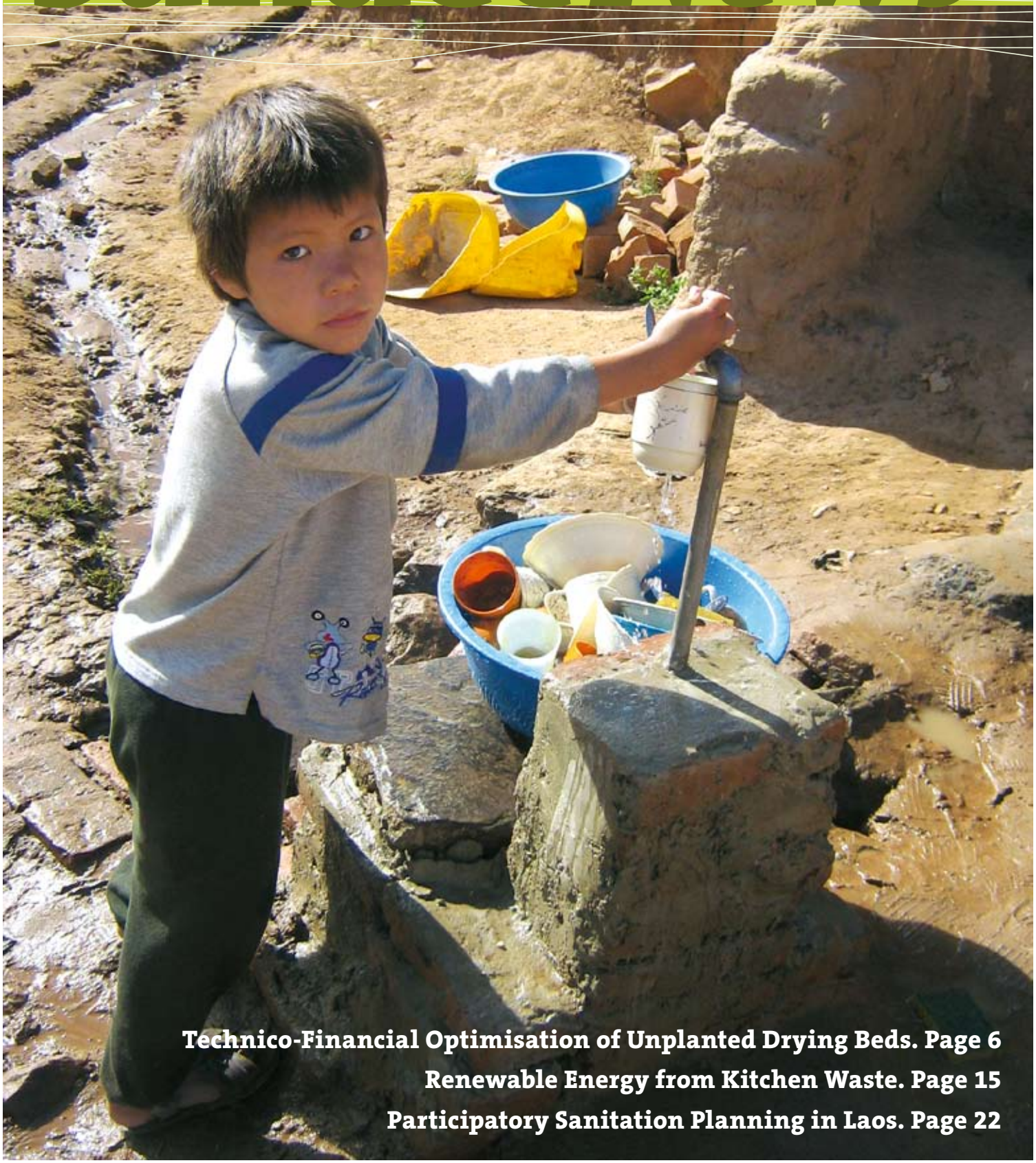

Economic Impact of N-enriched Excreta-based Co-compost (*Comlizer*) on Maize Production in Ghana

Poor soil fertility is a key factor limiting crop production in many parts of the tropics. Nitrogen-enriched waste products have the potential to improve crop yield on depleted soils and provide high financial returns. Noah Adamtey[1], Olufunke Cofie[1], Godfred K. Ofosu-Budu[2], Dionys Forster[3]

Due to several decades of soil nutrient mining, African soils have become very poor. Though the combined use of organic (e. g. manure) and inorganic fertilisers has been widely advocated, their access and affordability can be limited. An alternative nutrient source, such as excreta based compost-fertiliser mixture (*Comlizer*) is seen as an option. Use of *Comlizer* has several advantages, including minimising heavy metal accumulation in soils and plants and leaching of NO_3^--N into groundwater. Moreover, it improves growth, yield, nutrient uptake, and water use efficiency of maize. However, farmers are concerned with costs and returns from farm investment and rather reluctant towards the adoption of new products. To provide a better basis for decision, the economics of mixing co-compost with inorganic N fertiliser and the impact of *Comlizer* on maize production in Ghana have to be assessed.

Production costs of *Comlizer*

Production of N-enriched excreta-based co-compost (*Comlizer*) is outlined by [1, 2]. Cost analysis of *Comlizer* production includes: fixed costs (i. e. land, construction of drying beds, shield for co-composting and storage rooms) and variable costs (i. e. solid waste or human excreta delivery, inorganic fertiliser (ammonium sulphate), pulverising and sieving, bagging N-enriched co-compost, wages, and transport to main distribution outlet). Compared to a 50-kg ammonium sulphate fertiliser bag sold at US$ 21, production costs of ammonium sulphate-based *Comlizer* amounted to US$ 9 in 2006. Production costs of 50 kg *Comlizer* are thus, three times as high as 50 kg co-compost.

Agronomic and economic impact

A field experiment with Randomised Complete Blocks Design was conducted at the University of Ghana. Maize (*Zea maize* L.) was sown at a distance of 40 × 80 cm in plots of 4 × 3 m size and replicated three times. Yield was evaluated on a sandy loam soil (*Ferric Lixisol*) under rain-fed and supplementary irrigation from March to June 2007. The treatments tested include ammonium sulphate (dry)-based *Comlizer* (COASD) at 91 kg N ha^{-1}, farmer practice (FP), i. e. NPK + $(NH_4)_2SO_4$ at 150 kg N ha^{-1}, co-compost (CO), and poultry droppings (PD) at 210 kg N ha^{-1}. Production costs were highest for CO (1052 GH¢ ha^{-1}), followed by FP (711 GH¢ ha^{-1}), COASD (634 GH¢ ha^{-1}) and PD with 498 GH¢ ha^{-1} (Table 1). Highest grain yield (6294 kg ha^{-1}) was recorded for COASD compared to FP (5631 kg ha^{-1}), CO (5071 kg ha^{-1}) and PD with 4884 kg ha^{-1} (Table 2). The net profit yielded by COASD (3772 GH¢ ha^{-1}) was 17 %, 29 % and 43 % higher than with FP, PD or Co alone.

The aforementioned tables reveal that urban organic waste products, such as *Comlizer*, offer farmers the opportunity to improve crop growth and yield on depleted soils, while achieving high financial returns.

Treatment	Recommendation (kg N ha^{-1})	Costs (GH¢ ha^{-1})					
		Fix	Seed	Fertiliser	Insecticide	Labour	Total
S + Co + $(NH_4)_2SO_4$ (COASD)	91	12.5	18	360	7.5	236	634
S + Co-compost (CO)	210	12.5	18	778	7.5	236	1052
S + Poultry droppings (PD)	210	12.5	18	224	7.5	236	496
S + NPK + $(NH_4)_2SO_4$ (FP)	150	12.5	18	381	7.5	292	711
Soil alone (S)	–	12.5	18	0	7.5	180	218

Table 1: Production costs of maize with application of *Comlizer*, compost, inorganic fertiliser, and poultry droppings at recommended rates.

Treatment	Yield (kg ha^{-1})	Gross return[1)] (GH¢ ha^{-1})	Production costs (GH¢ ha^{-1})	Net return[2)]		BCR[3)]
				(GH¢ ha^{-1})	(US$ ha^{-1})	
S + Co + $(NH_4)_2SO_4$ (COASD)	6294	4406	634	3772	4072	6.9:1
S + Co-compost (CO)	5071	3550	1052	2498	2698	3.4:1
S + Poultry droppings (PD)	4884	3419	498	2921	3155	6.9:1
S + NPK + $(NH_4)_2SO_4$ (FP)	5631	3941	711	3230	3489	5.5:1
Soil alone (S)	3337	2336	218	2118	2287	11:1

Table 2: Economic analysis of the effect of *Comlizer*, co-compost, inorganic fertiliser, and poultry droppings on maize production.
[1)] Gross return = Total yield × market price (av. retail price per 50 kg of maize = GH¢ 35); [2)] Net return = Gross return - production costs; [3)] BCR (Benefit:Cost Ratio) = Gross return / production costs.

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