

AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

Can Crop Farmers Benefit from Substituting a portion of Mineral Fertiliser with Organic sources of N, P, K and S?

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Introduction and Rationale





Cropping systems provide the grains which underpin the nutritional requirements of many animal production systems. These grains carry nutrients from the croplands, concentrating them on animal farms. Commonly, by-products from dairy and poultry supply chains are nutrient-rich cattle slurry, dairy food processing sludge, poultry and broiler manure, used as organic fertiliser.

To close nutrients (N, P, K, S) cycling it is important to return these nutrients to the croplands. Balanced use of organic-inorganic fertilization showed the potential for higher crop yield, reducing chemical based fertiliser usage, and improving soil quality [1, 2].

I Farmers need to know an appropriate application rate of organic fertilisers with combination of chemical fertilisers. Limited study is available in the Irish condition to assess the impact of balanced organic and chemical fertiliser application on the crop yield and soil quality considering closing the C, N and P loop in agro-ecosystem.

The objective of this study was to assess agronomic benefits of using cattle slurry, dairy sludge and chicken manure in conjunction with chemical fertilisers on spring maize production in order to facilitate farmers' understanding to use these options and to replace chemical fertilisers.

Organic Fertilisers and Spring Maize Trial												
	Recycling Valuable Nutrients for Maize Production											
		Portry Broiler Manure Manure	Organia fortiligara	Total Nutrient Content in (dry weight basis)				ht basis)	(1)	(2)	(3)	
(a) (a)		404/10- 16/04/A Cathal	Organic fertilisers	DM (%)	N (kg/t)	P (kg/t)	K (kg/t)	S (kg/t)				
(b)			Cattle Slurry	9	38.1	7.9	55.6	4.8				
			Poultry manure	88	38.2	11.3	22.8	4.5				
			Broiler manure	45	44.3	10.7	39.8	5.3				
			Activated dairy sludge	11	44.8	34.1	4.9	5.6		A CONTRACTOR OF THE REAL PROPERTY OF	A BEALER STRATE	
Dairy food processing (a) Activated sludge, (b) DAF sludge	Cattle slurry	Poultry and Broiler manure	DAF dairy sludge	28	19.5	107	3.9	2.9	—	, Fertiliser application, (2) P e growth in 2019 at Arklow,		

Results

)
) P <i>€</i> 57
)

✓ Collected maize samples in sheaves of ten – Maize plants from fertilized plots were significantly taller with more cobs than unfertilized plots

Yield is significantly higher in fertilized plots compared to unfertilized plots

The fertiliser programmes incorporationg organic manures yielded as well as the mineral fertiliser programmes.

Cost analysis based on – CAN €274/t, Superphosphate €397/t, MOP €386/t, SOP €573/t (Chemical Fertiliser price November 2019 from CSO) [3], Poultry/broiler manure €25/t [4]; Cattle slurry €3/t [5]; Dairy processing DAF/Activated sludge €0/t (delivered and followed on with NMP by dairy companies). N availability source – [6,7,8]

 \checkmark Using 100% Chemical fertiliser costs significantly more than using a combination of organic and chemical fertiliser options while no yield difference found between them

Conclusions

Significant savings (23–37%) can be made when using organic fertilisers in conjunction with chemical fertilisers – farmers can save up to €168/ha when using poultry manure as part of their fertiliser programme for Spring Maize production.

Although nutrient content of different organic fertiliser options varies, an appropriate balanced fertiliser programme using organic

and chemical fertilisers can give similar yield and more sustainable profit if the nutrient content and requirement is known.

Future studies in this trial will look into crop nutrient uptake and benefits on soil quality for nutrient distribution, carbon and organic matter build up.

References

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N availability (%) Cost (€/ha)

453

285

336

312

349

334

100

63

50

30

31