Use of Seaweed as a Fertiliser for Grassland

Farm Advisory Service

Seaweed value as a fertiliser

Seaweed has been used as a fertiliser for grass and crop production for many years and provides a valuable source of nutrients that can be used to supplement bagged fertiliser. Table 1 below provides the current typical information on the nutrient value for seaweed. However, these can vary depending on seaweed species, moisture content and length of time composted.

Table 1 – Typical nutrient values for fresh seaweed

	Nutrient content (kg/tonne) fresh weight		
	Total N	Total Phosphate	Total Potash
Seaweed Typical values	5.0	1.0	12.0

It should be noted that seaweed has, as have all organic manures, a variability in nutrient content; to get the most benefit from seaweed as a fertiliser, take a representative sample from the harvested seaweed heap and have it analysed prior to application.

Fresh or composted?

SRUC did some work several years ago on the nutrient content of seaweed when it was fresh, semi composted and fully composted with the information gathered shown in table 2 below.

Table 2 – Nutrient values for seaweed from SRUC analysis

	Nutrient content (kg/tonne) fresh weight			
	Dry Matter	Total N	Total Phosphate	Total Potash
Fresh seaweed	147.0	3.8	1.4	13.5
Semi composted seaweed	188.0	4.7	1.7	10.6
Fully composted seaweed	170.0	7.9	2.0	7.4
Average	**168.3**	**5.5**	**1.7**	**10.5**

Unlike bagged fertiliser not all these nutrients are available from seaweed in the year of application and care should be taken to ensure that the benefit from the seaweed is not over or underestimated. The following sections detail the availability of the main nutrients.

The European Agricultural Fund for Rural Development: Europe investing in rural areas

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Main nutrients

Nitrogen (N)

This is available in two main forms:

Organic-N which is where the nitrogen is contained in organic forms that break down slowly to become potentially available for crop and grass uptake over a period of months or years; and readily available-N which is potentially available for rapid crop uptake.

Seaweed contains slightly higher levels of readily available-N compared to Farmyard Manures (FYM), which can be lost easily if applied at the wrong time of year when there is not a crop need.

Generally the readily available-N is commonly lost via ammonia volatilisation following surface application to land and is also lost in the form of nitrate by leaching, therefore depending on when the seaweed is applied, the % of nitrogen available to the crop following application will be between 5 and 15%. Loss will depend on time of application and the soil type, time taken to incorporate seaweed and time of year that the seaweed was applied.

Phosphate (P_2O_5)

Around 50% of the phosphate in seaweed is available to the crop in the year of application with the remainder becoming available to the crop in following years.

Potash (K_2O)

Around 80% of potash is available to the crop in the year of application with the remainder adding to the soil reserves.

Other nutrients

Seaweed also contains an appreciable amount of Sulphur and Magnesium and amounts of the micronutrients Boron, Cobalt, Copper, Iodine, Manganese, Selenium and Zinc which can be beneficial to crops and livestock. However, there is limited information on the availability of these micronutrients and any application should be viewed as contributing to the maintenance of soil reserves.

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Availability of nutrients

Table 3 below indicates the total nutrients available at different application rates while Table 4 provides the nutrients available to the crop in the year of application—assuming application is carried out at the optimum time of year.

Table 3 - Total nutrients from seaweed at various application rates

		Seaweed Manure - Total Nutrients in Application					
Application Rate		Nitrogen		Phosphate		Potash	
Tonnes/Ha	Tonnes/acre	kg/ha	units/acre	kg/ha	units/acre	kg/ha	units/acre
10	4	**55**	44	**17**	13.6	**105**	84
15	6	**82.5**	66	**25.5**	20.4	**157.5**	126
20	8	**110**	88	**34**	27.2	**210**	168
25	10	**137.5**	110	**42.5**	34	**262.5**	210

Table 4 - Available nutrients from seaweed at various application rates

		Seaweed Manure - Available Nutrients to following crop in Application					
Application Rate		Nitrogen		Phosphate		Potash	
Tonnes/Ha	Tonnes/acre	kg/ha	units/acre	kg/ha	units/acre	kg/ha	units/acre
10	4	**8**	7	**9**	7	**84**	67
15	6	**12**	10	**13**	10	**126**	101
20	8	**17**	13	**17**	14	**168**	134
25	10	**21**	17	**21**	17	**210**	168

Maximum application rate

The maximum rate that manures can be applied is 50 T/Ha (20 tonnes/acre).

However seaweed is normally applied at between 20 and 35 T/Ha (8 and 14 tonnes/acres).

For more information, check Section 4 of the Prevention of Environmental Pollution From Agricultural Activity (PEPFFA) guidance (https://www.gov.scot/publications/prevention-environmental-pollution-agricultural-activity-guidance/pages/4/).

Importance of pH

In order that nutrients can be fully utilised it is essential that the soil is at the correct pH of between 5.8 and 6.0 for grassland. Further information on liming materials and lime requirement can be found in TN714 – Liming materials and recommendations (https://www.fas.scot/publication/technical-note-tn714-liming-materials-and-recommendations/).

For example, the lime requirement for permanent pasture at a pH of 5.3 on a Humose soil is 3 T/Ha of a material with an neutralising value (NV) of 50%. If using shell sand, note the sand has an NV of 27% therefore an adjustment has to be made. Using the calculation shown in example 2 of TN714, the Adjusted rate = (50/27 x 3) = 5.6T/ha of shell sand is required.

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Grassland fertiliser requirement

The fertiliser requirement of grassland is dependent on how you intend to manage it. Relatively little will be required for extensive grazing, whilst intensive silage production results in a lot of nutrient offtake, which needs to be replaced.

To work out nutrient requirements, use the Technical Note TN726 – Fertiliser recommendations for grassland (https://www.fas.scot/downloads/tn726-fertiliser-recommendations-for-grassland-scotland/).

Example:

As an example for use of seaweed on an inbye grass field, the following is from a croft in Lewis. It has a field managed for a cut of silage and then grazing.

Table 5 below shows the nutrient requirement for a field under this management. The nutrient requirement is taken from Tables F(1), I, J, K, L and M in the Technical Note TN726.

The field has humose soil, a pH of 5.3, low Phosphate status and moderate Potash status. The croft has access to shell sand for liming (estimated neutralising value of 27%), seaweed for organic manure and bagged fertiliser for inorganic manure.

Table 5- Nutrient requirements for established grassland

Nutrients required for Established Grassland 1 cut silage (18t/Ha) followed by grazing						
Low Phosphate, Moderate Potash						
	Nitrogen		Phosphate		Potash	
	kg/ha	units/acre	kg/ha	units/acre	kg/ha	units/acre
Silage	120	96	91	72.8	108	86.4
Grazing	70	56	3	2.4	2	1.6
Total	190	152	94	75.2	110	88

Comparing Tables 4 and 5, an application rate of 15 tonnes/ha (6 tonnes/acres) will supply all the potash required, about 6% of the nitrogen and 14% of the phosphate required, provided the seaweed is applied in early spring. The remainder of the nitrogen and phosphate will require to be made up using either livestock manures or inorganic bought in bagged fertilisers. The phosphate and potash not available to the grass in the year of application will be added to the soil reserves.

Based on typical fertiliser values for Ammonium Nitrate, Triple Super Phosphate and Muriate of Potash of £240, £300 and £280 respectively the value of available nutrient applied with the 15 tonne/ha application is £8.34 of Nitrogen, £8.45 of Phosphate and £59.22 of Potash. In addition, the application will apply Sulphate, Magnesium and other micronutrients.

It should be noted that the seaweed should be allowed to breakdown fully before grazing or cutting (at least one month) to prevent transmission of potential pathogens or the addition of organic matter into silage bales causing mould in the silage.