

Kangaroo Island soil health report: results from 2016-2017 soil tests

Background

In 2016/17 Agriculture Kangaroo Island (AgKI) received funding and support through Natural Resources Kangaroo Island and PIRSA to assist landholders to undertake soil testing on their properties and provide interpretation of soil test results. Soil test kits are available to all producers through the Kingscote PIRSA Office and soil augers are available for loan. In the 2016-2017 season, over 30 KI farmers submitted 169 soil samples for testing.

Results

Soil pH

Soil pH is important as it drastically alters the availability of plant nutrients and the activity of many soil micro-organisms (refer to TABLE 1 for minimum pH targets).

TABLE 1: Target for minimum acidic pH.

Land use	Target pH (CaCl_2)
Extensive grazing	5.0 – 5.5
Intensive cropping/grazing	5.5
Most horticultural crops	5.5 – 6.5

Most soil samples taken during the 2016-2017 season were below critical pH levels. FIGURE 1 shows that the average pH in all hundreds was below 5.5 ($\text{pH}_{\text{CaCl}_2}$), the majority showing an average pH of 5.0 or below. At these levels, pH will be limiting farm productivity and liming should become a financial priority.

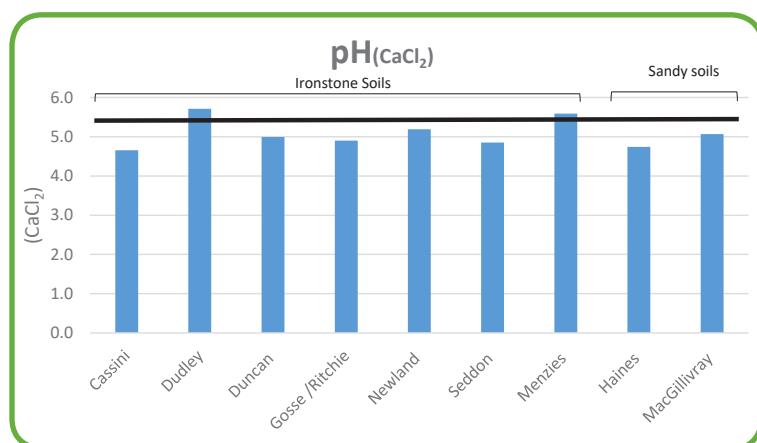


FIGURE 1: Average soil $\text{pH}_{\text{CaCl}_2}$ results for each hundred during the 2016-2017 season. The black line indicates the target pH level of 5.5 (CaCl_2).

Salinity

Saline soils are defined as soils that contain a high enough level of soluble salts in the root zone that plant growth is adversely affected. Ideally, soils should have a salinity level of less than 2 dS/m (for salt sensitive species). Of the soil samples taken, almost all samples were below 2 dS/m.

Organic Carbon

The organic carbon test is a useful indicator of organic matter status, and therefore of overall fertility, microbial activity, and the structural stability of the soil. The ideal target level of organic carbon varies with soil type i.e. sandy soils greater than 1% is desired, through to greater than 2% in clay soils.

Of the soils tested during the majority were well above critical values.

Soil Nutrients

Maintaining an adequate nutrient status in the soil is paramount to determining the productivity of the soil. Phosphorus, potassium and sulphur are essential nutrients for plant biomass and yield production (see TABLE 2 for target levels).

TABLE 2: Target levels for essential nutrients

Soil nutrients	Target levels	
	Ironstone Soils	Sandy Soils
Phosphorus (Colwell)	35-45 mg/kg	> 20 mg/kg
Potassium (Colwell)	> 120 mg/kg	>120 mg/kg
Sulphur	6-8 mg/kg	> 10 mg/kg

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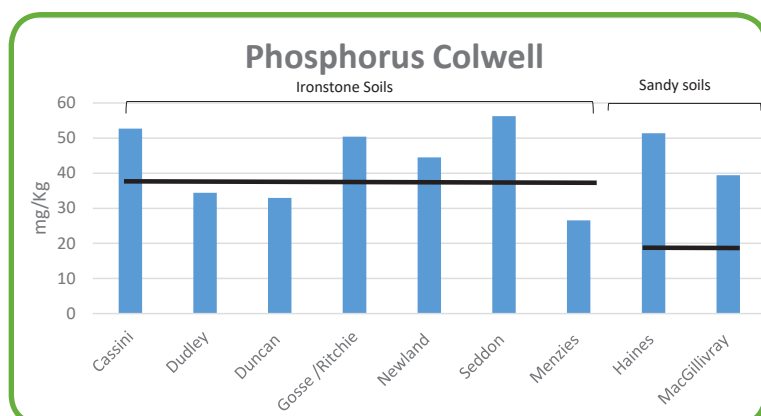


FIGURE 2: Average soil phosphorus levels for each hundred during the 2016-17 growing season. The black lines indicate target soil phosphorus levels for both sandy soils and ironstone soils.

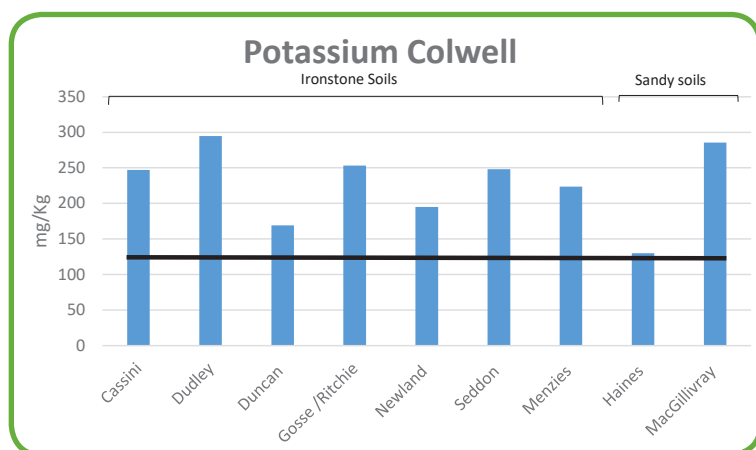


FIGURE 3: Average soil potassium levels for each hundred during the 2015-2016 season. The black line indicates the target soil potassium level of 120mg/Kg.

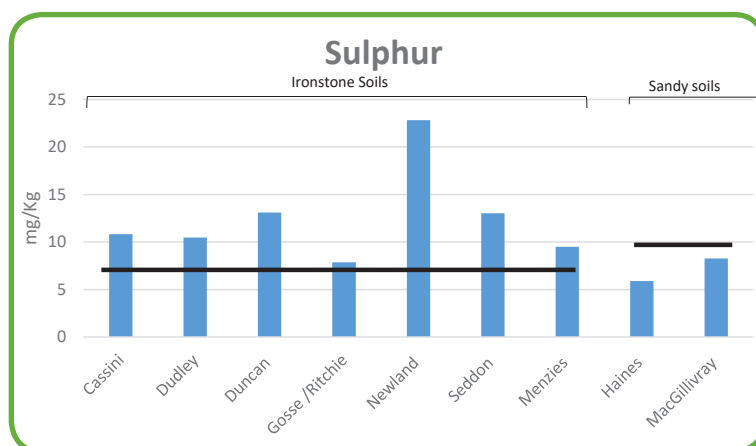


FIGURE 4: Average soil sulphur levels for each hundred during the 2015-2016 season. The black lines indicate the target soil sulphur levels.

During 2016-2017, almost all of the samples collected from hundreds with predominantly sandy soils, had phosphorus levels greater than 20 mg/kg. Of the hundreds with predominantly ironstone soils, almost half the samples had phosphorus levels lower than the recommended level of 35-45 mg/kg (FIGURE 2).

The majority of soil samples in all hundreds had potassium levels above 120 mg/kg (FIGURE 3).

Of the hundreds with predominantly ironstone soils, the majority of samples had sulphur levels greater than 6-8 mg/kg (FIGURE 4). Of the hundreds with predominately sandy soils, the majority of samples from the hundred of Haines were below the critical value of 10 mg/kg.

Summary

The 2016-2017 soil tests carried out by Kangaroo Island farmers indicate that overall, soils in the area are on target or above for organic carbon and potassium and low in salinity.

Soil phosphorus levels were low in the predominantly ironstone soil hundreds. Sulphur levels were also low on some properties with sandy soils. Across the Island, soil pH(CaCl_2) levels were below critical values. Areas where the coupling of low phosphorous and low pH is occurring will limit overall pasture productivity.

Soil types vary within each hundred, so care must be taken in the broader interpretation. In addition, the data only reflects the number of samples taken in each Hundred, which may represent only a few properties. The data and resultant graphs can only be interpreted to the point of identifying trends over time.

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Summary of average results, range and number of samples for the 2016-2017 season for each hundred area

TABLE 3: Summary of results for sandy soils

	pH (CaCl ₂)	Phosphorus (mg/kg)	Potassium (mg/kg)	Sulphur (mg/kg)	Conductivity (dS/m)	Organic carbon (%)
Target levels of Sandy Soils						
	> 5.5	> 20 mg/kg	>120 mg/kg	> 10 mg/kg	0-2 dS/m	> 1.0%
HUNDRED (no. samples)	Average (range)	Average (range)	Average (range)	Average (range)	Average (range)	Average (range)
Haines (13)	5.0 (4.3-5.2)	51 (39-62)	130 (58-385)	6 (3.2-9.8)	0.08 (0.05-0.18)	3 (2.1-4.6)
MacGillivray (36)	5.1 (4.1-6.2)	39 (16-93)	286 (50-750)	8 (4.4-15.4)	0.10 (0.3-0.33)	3 (1.83-4.85)

TABLE 4. Summary of results for ironstone soils

	pH (CaCl ₂)	Phosphorus (mg/kg)	Potassium (mg/kg)	Sulphur (mg/kg)	Conductivity (ds/m)	Organic carbon (%)
Target levels of Ironstone Soils						
	> 5.5	35-45 mg/kg	>120 mg/kg	6-8 mg/kg	0-2 ds/m	> 1.0%
HUNDRED (no. samples)	Average (range)	Average (range)	Average (range)	Average (range)	Average (range)	Average (range)
Cassini (21)	4.7 (4.2-5.6)	53 (14-76)	247 (85-442)	11 (4-14.2)	0.12 (0.4-.21)	4 (2.6-4.3)
Dudley (11)	5.7 (4.8-7)	34 (15-60)	295 (254-416)	10 (6-16.9)	0.20 (0.14-0.32)	4 (3.54-5.33)
Duncan (15)	5.0 (4.5-6.3)	33 (20-61)	169 (66-396)	13 (4.3-65.6)	0.15 (0.03-1.03)	4 (1.92-5.6)
Newland (15)	5.2 (4.4-8.5)	45 (15-107)	195 (39-453)	23 (4.6-168)	0.3 (0.66-2.77)	3 (0.14-5.5)
Ritchie (7)	4.9 (4.5-5.3)	50 (30-71)	253 (141-343)	8 (5.5-9.9)	0.11 (0.06-0.16)	4 (2.65-5.25)
Seddon (13)	4.9 (4.3-6.3)	56 (25-111)	248 (113-355)	13 (5.1-20.6)	0.16 (0.07-0.33)	5 (3.1-5.49)
Menzies (24)	5.6 (4.2-7.7)	27 (5-48)	223 (44-580)	9 (3.3-45)	0.32 (0.03-3.07)	2 (0.2-4.26)

Take home messages

- Soil testing is essential for monitoring soil fertility levels
- Of all the soil samples taken the majority were below critical levels for pH
- Sulphur levels were low on some properties with sandy soils.

For further information contact

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- Agriculture Kangaroo Island through the National Landcare Program
- Natural Resources Kangaroo Island
- PIRSA

Note: The information used was sourced from individual Kangaroo Island farmer soil tests and analysed using CSBP Analytical Laboratory in Western Australia.