

ANDREW KNOTT

GREENKEEPING - DATA DISCOVERY

The data you keep can be useful in understanding problems you experienced.

24/2/2024

GREENKEEPING - KEEPING RECORDS

- Takes to much time
- Take up space
- No use
- What's the point in it



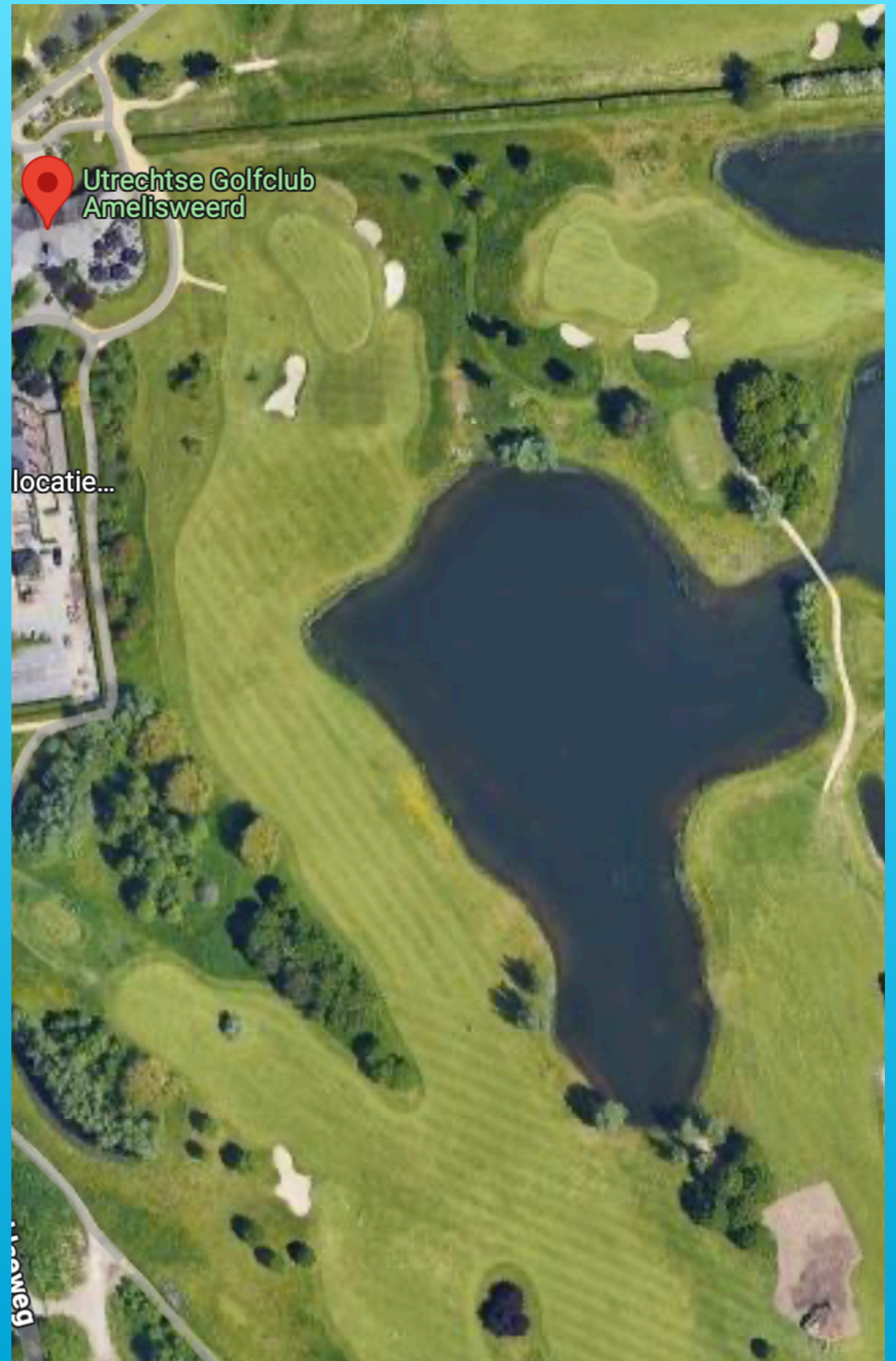
GREENKEEPING - RECORDS CAN SOLVE PROBLEMS

- Provide clues
- Highlight weak areas
- Help learn
- Improve future strategies



GREENKEEPING - EXAMPLE - GOLFCLUB AMELISWEERD

- In 2023 growing season
- Experienced thinning turf on the greens
- In weeks 33, 34, 35
- Reduced grass growth on greens



GREENKEEPING - DGB DATABASE

- Amelisweerd records in the DGB database
- Weather records

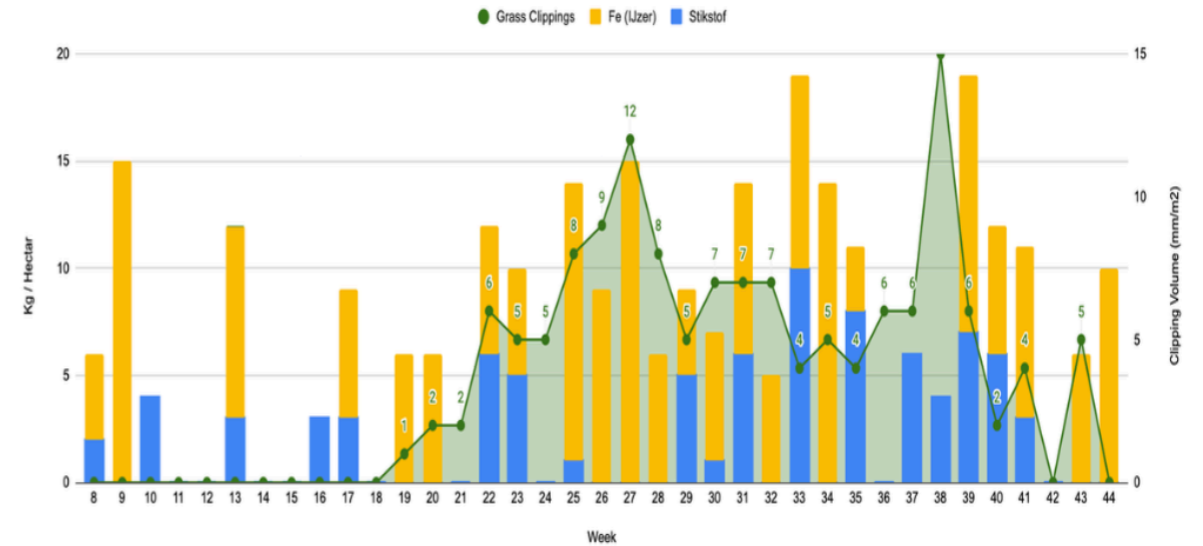
Amelisweerd	25	26	27	28
Clegg (STRI)			96 99 97 94	
Stimpreading	9 9 9 9		9 9 9 9	
Beluchten < 5 cm				
Beluchten < 15 cm				
Doorzaaien Roodzwenk				
Fe (IJzer)	13 13 13 13	9 9 9 9	15 15 15 15	6 6 6 6
Sporen	10 10 10 10			10 10 10 10
Wetting agent	20 20 2 20		40 40 40 40	
Calcium (bemesting)				
Magnesium (bemesting)	2 2 2 2			
Trueness				
Doorzaaien Struis				0 0 0 0
Dressen	0 0 0 0	0 0 0 0		0 0 0 0
Kalium (bemesting)				
Stikstof (bemesting)	1 1 1 1			
Hot 6			80 70 70 80	
Grass Clippings	8 7 8 9	10 8 7 10	13 9 11 14	8 7 8 9
Wetting Agent met anti dauw				
Fulvine	10 10 10 10			
Mn	0 0 0 0			

GREENKEEPING - DGB - REPORT

- Using Amelisweerd records
- Overlapping weather records
- Trying to find the reason why “thinning turf” was experienced in 2023

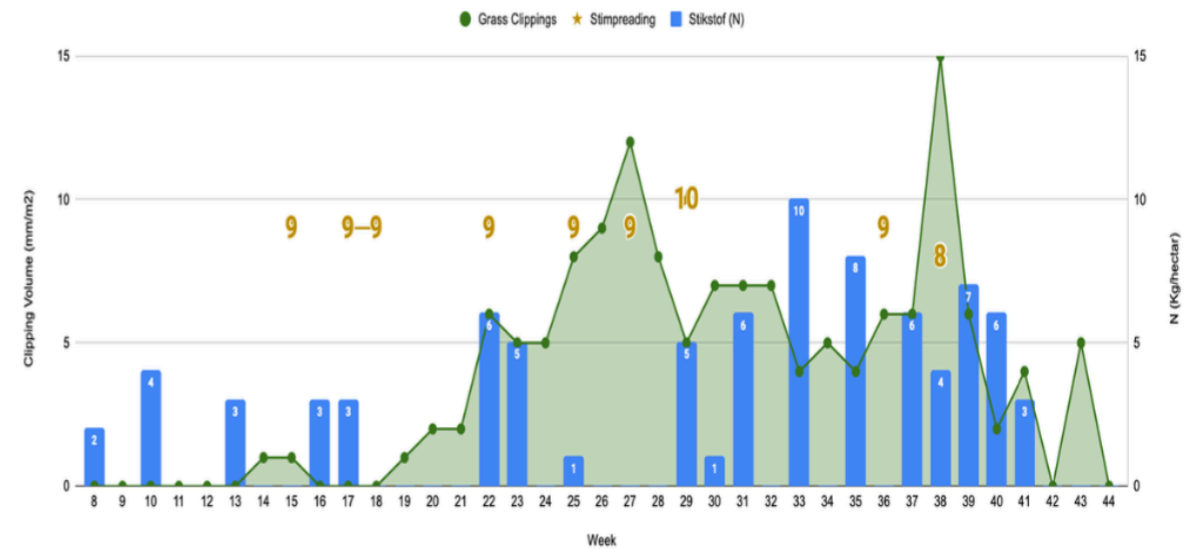
Amelisweerd 2023 - DGB data

Amelisweerd 2023 - Stikstof & Ijzer & Grass clippings



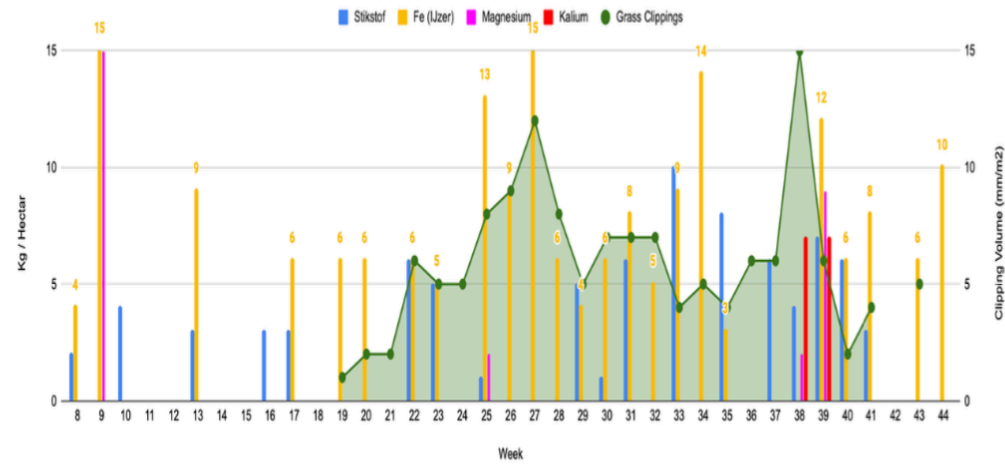
- After applications of Ijzer at 15kg/hectare or more Grass clippings volume reduces.

Amelisweerd 2023 - Stikstof & Stimp speed & Grass clippings



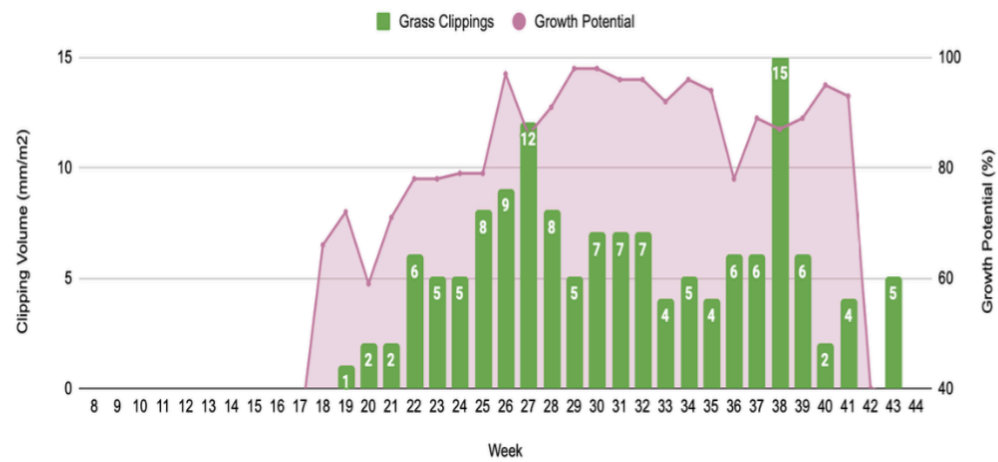
- Week 29 had the highest speed of 10, with a grass clippings of 5.
- Week 38 had the lowest speed of 8, with a grass clippings of 15.

Amelisweerd 2023 - Nutrients & Grass clippings



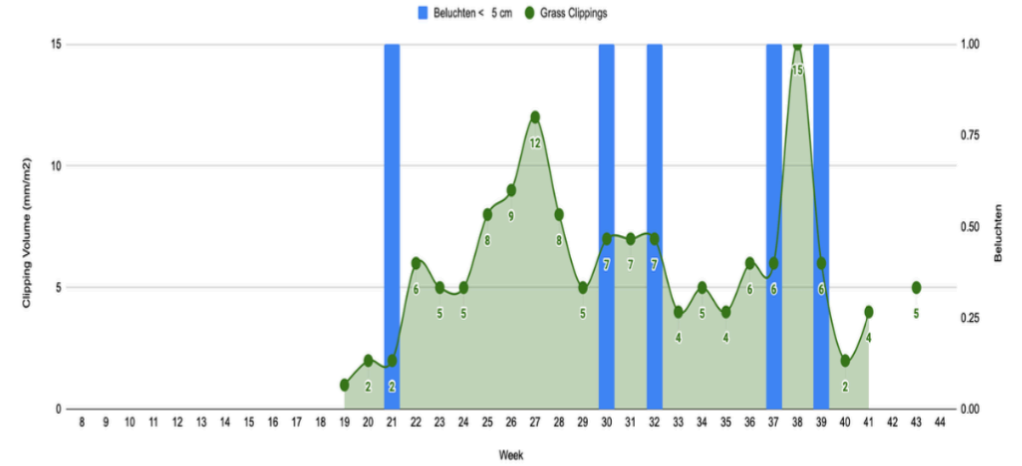
- Week 38 & 39 Kalium application. Was fusarium experienced from week 40 onwards ?

Amelisweerd 2023 - Growth Potential & Grass clippings



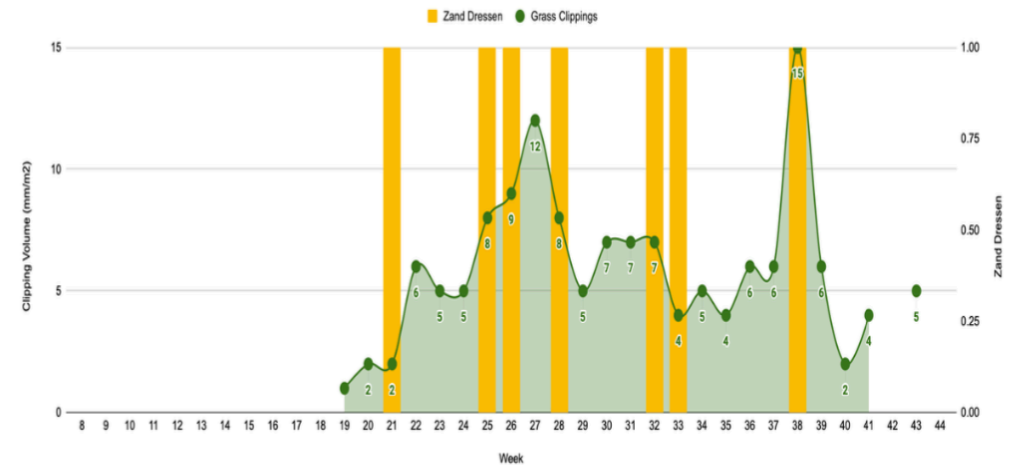
- Weeks 33,34,35 where reported thinning of turf was observed. The Growth Potential was above 95%. So average day/night temperatures were conducive for grass growth.
- Week 38 Grass clippings volume was out of proportion, compared to Growth Potential.
- Growth potential data is taken from Den Haag weather data.

Amelisweerd 2023 - Beluchten & Grass clippings



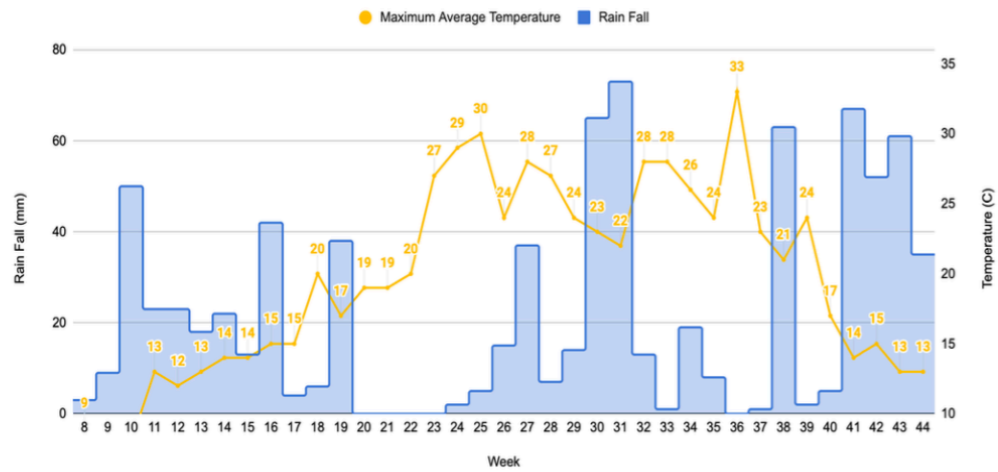
- Following Beluchten events, Grass Clippings volume reduces.
- How many rolling applications did the greens receive in weeks 21,21,23,30,31,32,37,38,39. ?

Amelisweerd 2023 - Zand Dressed & Grass clippings



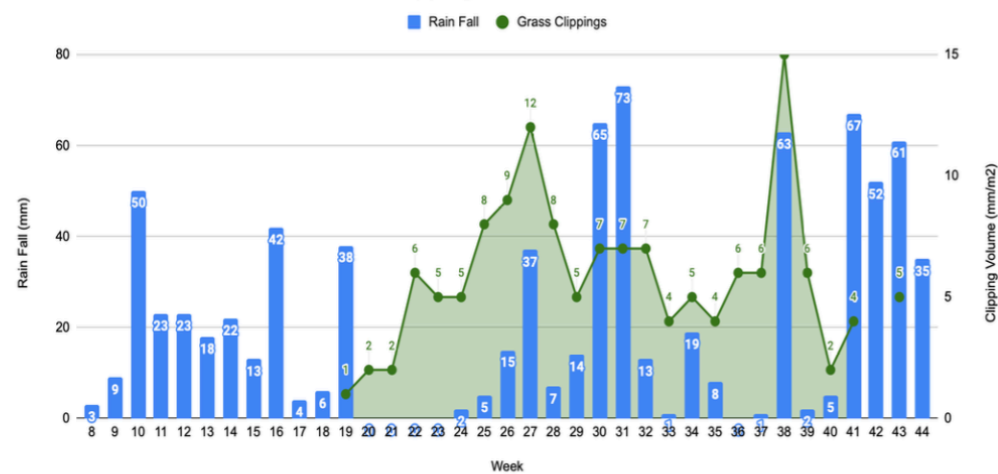
- Following Sand Dressing events in weeks 28,32,33,38, Grass Clippings volume reduces.

Amelisweerd 2023 - Maximum Average Day Temperature & Total Rain Fall



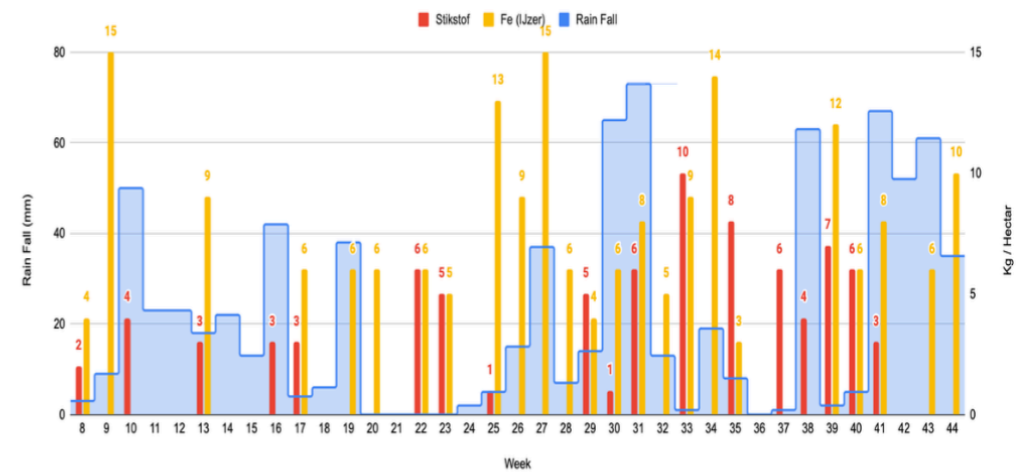
- Weeks 33,34,35 limited rainfall.
- Week 36 had the highest average day temperature of the year.
- Cool season grass's are at the optimum temperatures range between 15°C - 24°C

Amelisweerd 2023 - Rainfall & Grass Clippings



- Weeks 33,34,35 limited rainfall.
- Weeks 32,33,34,35,36,37 rainfall was limited. In the same weeks Grass Clipping also reduced.
- Relationship between Rainfall and Grass Clippings. If Rainfall is limited, Grass Clippings volume reduces.

Amelisweerd 2023 - Rainfall & Stikstof & Ijzer



- Weeks 32,33,34,35, large quantities of mineral synthetic fertilisers were applied.
- During these same weeks there was limited rainfall experienced.
- Was any burning of the leaf blade experienced during this period ?

I feel the thinning of the turf experienced during the 2023 season, in the weeks 33,34,35 was due to a combination of weather and maintenance factors during week 32. These factors created stress on the grass sward.

The use of mineral synthetic fertilisers during low moisture (rainfall) conditions has the effect of dehydrating the grass plant. This is due to the salt content contained within this type of fertiliser. Ammonium Sulphate has a Salt Index (SI) of 68% and Iron Sulphate has a Salt Index (SI) of 55%. The timing of the sand topdressing in weeks 32 & 33 will also have increased stress on the grass plant via the sand particles damaging the grass leaf cell walls. Possible additional rolling applications could have increased this damage.

During week 32 and the following weeks the grass plant was already experiencing stress conditions due to the limited rainfall and high daily maximum average temperature.. Then had the added stress of the dehydration effect from mineral synthetic fertilisers. Also extra stress from the application of sand topdress, and rolling. I feel this is why thinning of the turf was experienced, the intensity of stress from the combined weather and maintenance factors, was enough to create a population decrease, and limited grass plant recovery.

Week	Rain	Temp	Nitrogen	Ijzer	Zand	Beluchten
	mm	c	Kg/h	Kg/h	occurrence	occurrence
32	13	28	13	5	1	1
33	1	28	1	9	1	0
34	19	26	19	14	0	0
35	8	24	8	3	0	0
36	0	33	0	0	0	0



Food and Agriculture Organization of the United Nations

Salt-affected soils

A global concern
reducing agricultural
productivity

Improper water management
(insufficient water supply, poor
water quality, reuse of brackish
water and bad drainage systems)

HEALTHY SOILS

A healthy soil is able to sustain the productivity, diversity, and environmental services of terrestrial ecosystems.

Good and stable aggregates

Available water

Bad structure

SALINE SOILS

Saline soils have excessive levels of soluble salts. It can negatively impact or inhibit plant growth and can be toxic to life.

SODIC SOILS

Sodic soils have a high amount of adsorbed sodium. It leads to degradation of soil structure and inhibits plant growth.

High content of soil organic carbon

Rich biodiversity

No contaminants

Nutrient imbalance

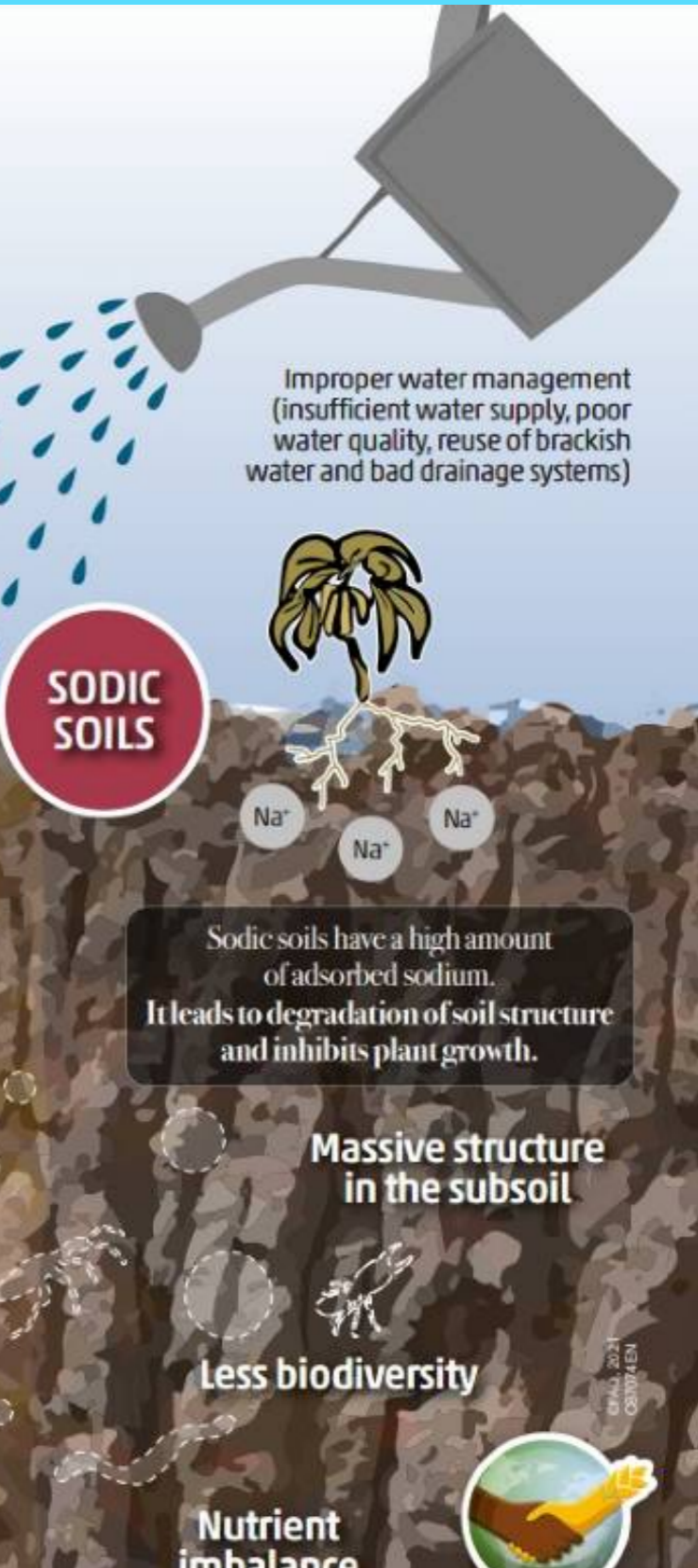
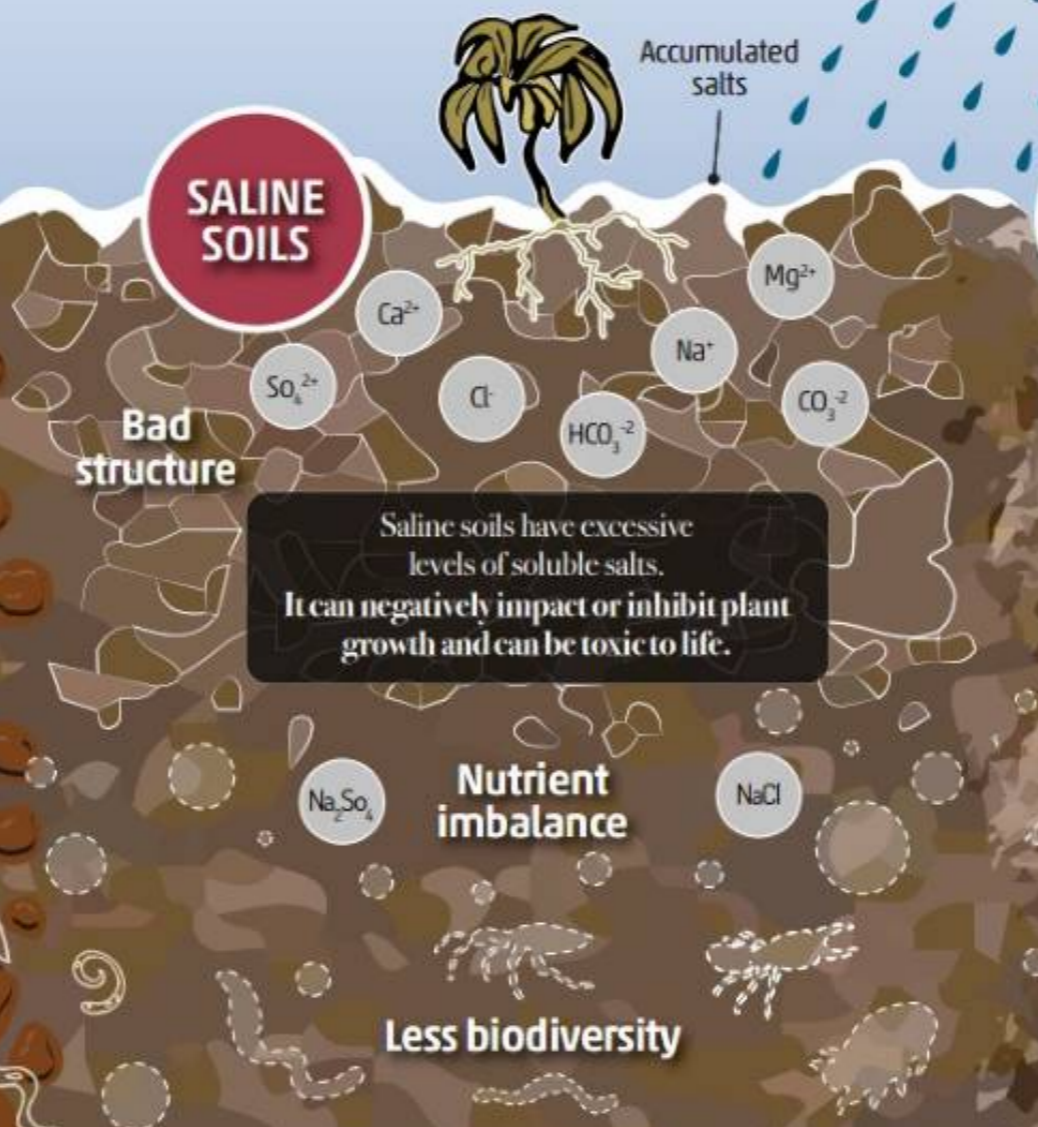
Less biodiversity

Less available water

Massive structure in the subsoil

Less biodiversity

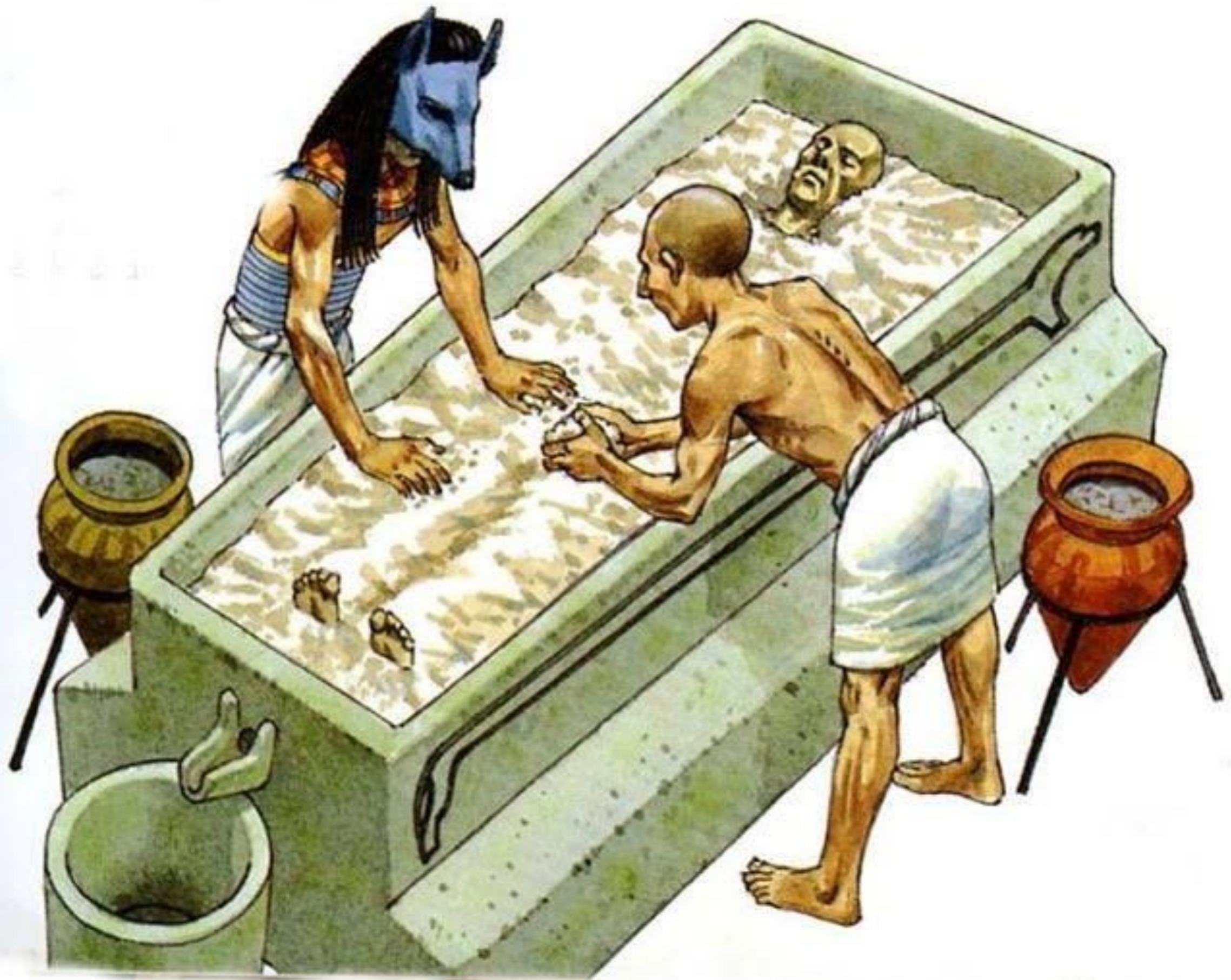
Nutrient imbalance



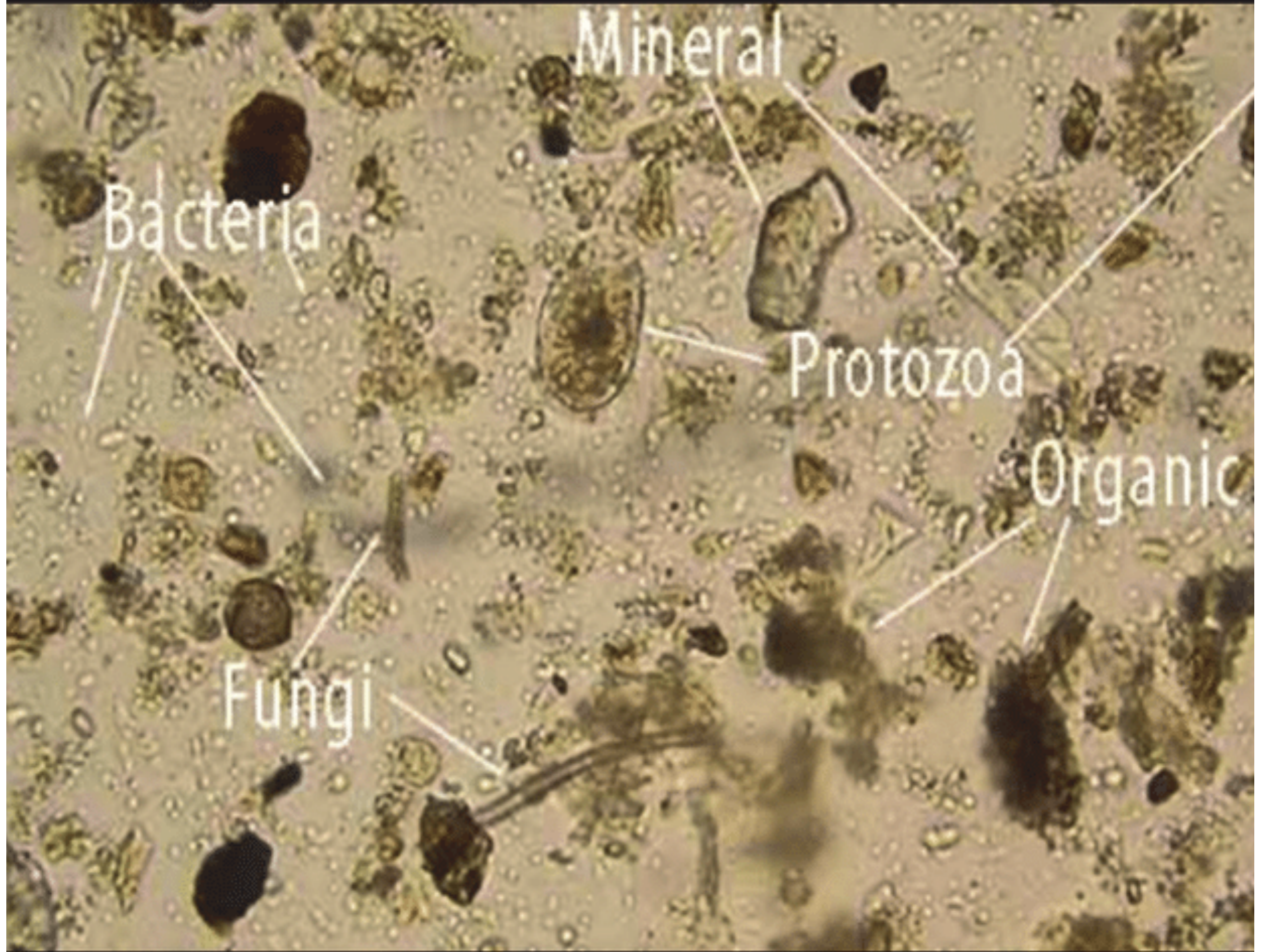
GLOBAL SOIL PARTNERSHIP

SALT INDEX OF FERTILISERS

Fertiliser Type	Analysis	Salt Index	Partial Salt index
Ammonium Sulfate	21% N 24% S	68.3	3.3
Urea	46% N	74.4	1.6
Potassium Sulfate	41% K 17% S	42.6	0.9
Magnesium Sulfate	10% Mg 12% S...	44	2.7







Mineral

Bacteria

Protozoa

Organic

Fungi

GREENKEEPING - **HIGH SALT INDEX** **FERTILISERS**

- **Timing**
- **After care**
- **Effect**
- **Record**
- **Result - (Observations)**



HAPPY SOIL

THE END

Happy Golfers



HEALTHY LIFE