

AIM: The aim of this experiment is to investigate how effective the usage of polyacrylamide compounds are for increasing crop yields, especially under drought conditions as experienced on our farm near Kaniva

HYPOTHESIS: I have hypothesized that if the plants with ‘Water Jelly Crystals’ are given the same amount of water than those without, they will grow better and produce a higher yielding crop, compared to the plants without the crystals.

- MATERIALS:**
- 12 x 2L Juice/Milk Containers
 - 2 x Fruit Crates
 - 24 x Hindmarsh Barley Seeds
 - Scales
 - Marker/Pen
 - 30 x ‘Water Jelly Crystals’
 - 12kg Sandy Loam (Soil Collected From Yarrock)
 - 12 x Labels
 - Notebook



Seed Test Results:
Hindmarsh Barley (Feed Quality) 12/11/14
Test Weight; 67
Protein; 10.5
Moisture; 10.2
Screenings; 5.19
Retention; 72.39

200 Seeds 8.2g
1000 Seeds 41g
1kg = 24,890 Seeds
Sowing Rate = 65kg to hectare
= 1,585,365 seeds to hectare
158 plants per m²

	ESTIMATED AV YIELD kg/ha		
DESCRIPTION	Control	AG100 SAP	Difference %
Light sandy soil, drought rainfall, 175mm annual RF	162.5	195	20
Light sand soil, average rainfall, 315mm annual RF	97.5	195	100
Light sandy soil, high average rainfall, 426mm annual RF	0	552.5	552.5

- METHOD:**
- 1.Cut tops off Milk containers, and fill with 1kg of sandy loam soil in each pot, collected from Yarrock Farms.
 - 2.In six of the milk containers place 5 ‘Water Jelly Crystals’.
 - 3.Place 2 Barley seeds in each of the 12 containers.
 - 4.To simulate rainfall, water 4 pots with the average rainfall, another 4 pots with minimum average rainfall, and the last 4 pots with the maximum average rainfall as shown on the attached graph. Then label accordingly.
 - 5.Water the plants each week, and record results.
 - 6.Count the grains in the heads and calculate a yield.

Soil test results courtesy of Jessica Drake, School of Chemistry, Monash University

Nutrient/Property	Value
pH (1;5 water)	7.23
Conductivity (1;5 water, dS m ⁻¹)	0.041
% OM	1.4
Ex. Mg (mg kg ⁻¹)	89
Ex. K (mg kg ⁻¹)	92
Ex. Na (mg kg ⁻¹)	14
Cowell-P (mg kg ⁻¹)	10
Ex. Ca (mg kg ⁻¹)	915
S (mg kg ⁻¹)	2.7



INTRODUCTION: I come from a rural community, Kaniva. I have grown up on a farm and have experienced the effect of drought first hand. After being in drought for a decade, we started looking at alternative farming. We didn't have much luck until dad started trial-ling Polyacrylamide crystals. I saw my EEI as a great opportunity to look further into the usage of these crystals. Polyacrylamide (IUPAC poly (2-propenamide) or poly (1-carbamoylethylene), abbreviated as PAM) is a polymer (-CH₂CHCONH₂-) formed from acrylamide sub-units. It's highly water-absorbent, forming a soft gel when hydrated. It has been used in soft contact lenses, along with being used as a filler for facial surgery. The type of polyacrylamide compound I am looking into is ‘Water Jelly Crystals’ they're an example of hydro-gels, which are superabsorbent polymers.

DISCUSSION: You can see a difference between the plants with polyacrylamides and those in regular soil. During several frosts and 30 degree days the barley in regular soil died as it had no water, where as the plants with polyacrylamides had better roots and remained fine throughout the frost and heat periods. In conclusion, the barley with polyacrylamides watered under a drought and average rainfall scenario had an increased yield of 20% and 100% respectively. It was unfortunate that all plants in both of the high rainfall control pots died while the pots treated with polyacrylamides grew extremely well and had the highest calculated yield, this has distorted the yield percentage difference. However the results are pleasing and it appears that using Hydro-gels to harvest rainfall can increase crop yields under average to below average conditions.

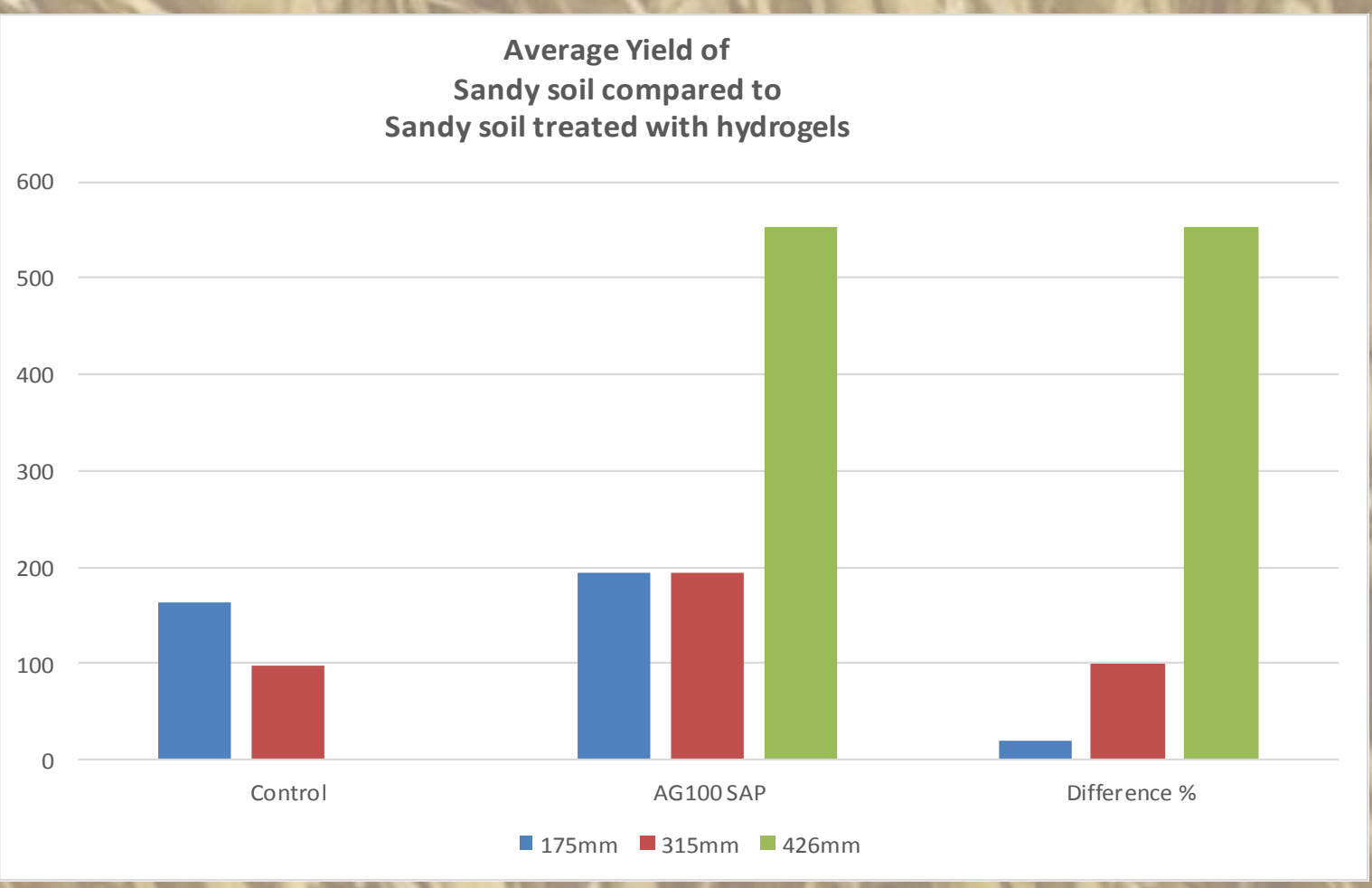
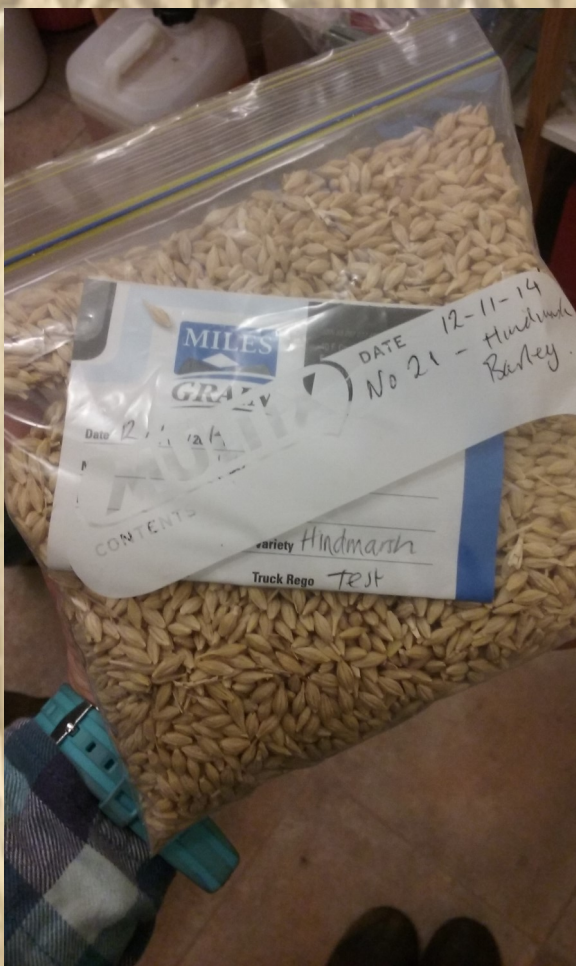
Can Harvesting Rainfall Using Hydro-gels Increase Crop Yields?

Can using Polyacrylamide crystals in drought effected areas increase agricultural yield & production?

By Louise Hobbs, Kaniva College

CONCLUSION: In conclusion the Barley planted with hydro-gels proved to produce a high yielding crop, however the trial would need to be conducted again for the whole growing season, as some plants had not yet reached maturity and formed a head, I was not able to determine if there was any influence of seed quality. I planted 2 pots of the same and in some cases both these died completely, henceforth not creating a true result.

References:
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ACTUAL YIELD				ESTIMATED		AG100	Rainfall		
Date	Pot	Grains	Weight g	Weight g/ m2	Yield kg/ha	Treatment	Drought	Average	High av.
10/10/2015	1	0	0	0	0	Y		X	
10/10/2015	2	6	0.246	39	390	Y		X	
10/10/2015	3	0	0	0	0	Y	X		
10/10/2015	4	6	0.246	39	390	Y	X		
10/10/2015	5	10	0.41	65	650	Y			X
10/10/2015	6	7	0.287	45.5	455	Y			X
10/10/2015	7	3	0.123	19.5	195	N		X	
10/10/2015	8	0	0	0	0	N		X	
10/10/2015	9	5	0.205	32.5	325	N	X		
10/10/2015	10	0	0	0	0	N	X		
10/10/2015	11	0	0	0	0	N			X
10/10/2015	12	0	0	0	0	N			X