

Impacts of the 2018 drought on agriculture

Synthesis of responses to interview questions.

How do you think that the hot, dry weather in the summer of 2018 affected your production? Which crops were most affected and why?

Potatoes

The wet conditions in April meant planting was late (late April, into May) and planting conditions were poor [7]*.

A combination of late planting and the prolonged hot and dry weather stalling tuber growth earlier in the season has largely impacted yields (AHDB, 2018).

The high radiation in the summer, should have meant that irrigated crops would give high yields, but irrigation couldn't compensate for poor planting conditions. The sudden change in weather led to rapid emergence [7].

Worst hit areas was East Anglia (especially Norfolk and Cambs), Salop, Cheshire and Lancs. In Cheshire, many growers did not have the equipment to irrigate [6].

Yorks, Notts, Staffs and Hereford were less badly hit [6].

Yield

Nationally AHDB reported potato yields were down on average by 13% but this masked significant regional variations and differences between varieties and whether rainfed or irrigated [9]

In general, yields across Great Britain varied significantly dependent on availability of irrigation and soil type (AHDB, 2018).

English yields this season fell to 40.1t/ha, with large falls in production recorded in most regions. The Eastern counties appear to have been particularly affected, with yields down 18% from 2017, at 40.4t/ha (AHDB, 2018).

The drought had significantly less impact in Scotland. Yields in Scotland were above average at 49.2t/ha, a 3% increase from 2017 (AHDB, 2018).

Crops that should have yielded 60 t/ha were giving 50 t/ha (17% reduction) [7].

We suffered with potato yields typically being 25% down on average [9]

In contrast, [REDACTED] crops were down in the Lincs area by c50%, and irrigated crops typically down 25% [9]

Our yields on potatoes varied between 10 and 25 t/ac reflecting the amount of irrigation we applied, with 9 acre inches applied by boom on the high yielding crop and only 3-4 ac inches on the low end crop. [9]

* Numbers in [brackets] refer to respondent number

Potato yields were 15 – 20% down on average [6].

Yields were down on all crops, typically 10-20% quality also impacted [11]

Early potatoes were 20 – 25 t/ha (8-10 t/ac) down, Salad potatoes down 15%, Maincrop down 20% [3]

Pots were adequately irrigated – early planting maincrops hit on yield down 20% (80% of production attained) due to maturing in high temps. [8]

The later planted pots did well, benefitted from some rain in July and hit 120% of target production, so yields up 20%. [8]

Potatoes where there was no irrigation 40% reduction [13]

Seed potatoes on land without irrigation hit worst [2]

Quality

Tuber numbers were up, but the potatoes were smaller, some very small [6].

Rain at the end of the season led to lower than average dry matter % at harvest. This means more oil uptake when making crisps [6].

Quality issues too with secondary growths and sprouting – but everyone seemed to experience these so there was less of a penalty on crop pricing because of pressure on market supply. [9]

Packers now much more critical of quality and looking to reduce price they pay down from £300/t to £150-200/t [9]

Irrigation in windy conditions led to poor uniformity and increased scab in some parts of the field [7].

Processors buying seed potatoes from Scotland [4]

Peas

Vining peas on light land were affected [2]

<https://www.bbc.co.uk/news/business-44822006> (13 July - warning of shortage of peas)

Carrots

Prioritised irrigation on the high value potatoes and carrots suffered. [9]

Lack of straw for mulching [5]

We suffered with carrots down 15% [9]

Other veg

Parsnips got water later in the season, once peak demand from pots had reduced. Reasonable yields on parsnips but not exceptional quality. 75% recovery of yields [8]

The potatoes were given priority, then horseradish and parsnips. [11]

Onions

All vegetable crops produced lower yields and quality [2]

We only produced 60% of our budgeted onion crop which was also seriously compromised on size [2].

We didn't have spare water or equipment to help get onions going. Later planted onions matured earlier but suffered all the way through the cropping season. [8]

Lettuce & salads

<https://www.bbc.co.uk/news/business-44664834> (30 June - warning shortage of lettuce)

Dairy

<https://www.fwi.co.uk/business/markets-and-trends/dairy-markets/drought-cost-to-uk-dairy-revealed-as-production-catches-up>

Sugar beet

Drilling was late due to the cold wet spring [1].

Early deficit (in May) resulted in considerable 'flagging' (crop lying flat and leaves dying) [1].

On rain fed crops ██████████, the expectation is that yield may be reduced by up to 30% but this is very variable depending on the soils [1].

Sugar beet. Yields 30% down on last year (which was a good year), 15% down on average. [2]

Sugar beet worst year in living memory! [3]

Sugar beet that wasn't irrigated was 25% down whereas irrigated beet was 10% above average. [12]

We irrigated 120ha of sugarbeet with 100mm of water. Sugar yield in the sugarbeet that wasn't irrigated was slightly higher than average which we would expect as the sun would have produced good sugars that weren't diluted by large roots. The irrigated beet sugars were 18-19% which was brought about by the irrigation and subsequent size of canopy that was achieved. Perhaps if we had stopped irrigating earlier then sugars ay have been even higher. However, we had 2 fields exceed 100t/ha so we mustn't grumble. [12]

The sugar beet was the biggest affected with an average yield reduction of 22.2%. [15]

Sugars were not too bad with an average of 17.5% [15]

Combinable crops

Yield

Total harvest similar to average, but large range in yields

Light land crops - especially spring varieties - were the worst affected by the dry conditions, with soil moisture levels being insufficient to adequately support the crops through the duration of the dry spell. For many crops on the heavier clay soils, heavy rain in April and May meant that soils had good reserves of water and were able to sustain crops throughout much of the grain fill period.

Winter wheat yields ranged from 2.5t/ha on very light land to 8.2t/ha on the heavier soils, rising to 11.5t/ha or higher in parts.

Winter barley on heavier land, yields of 8.0t/ha were produced by conventional varieties and 9.0t/ha on hybrid varieties, rising to 11.0t/ha for the best crops. In these regions, some areas of light land delivered yields of about 6.0t/ha, as most of the yield building had already occurred by the time drought set in. However, in the Midlands, northern and western England, yields tended to be slightly below the GB five-year average, with yields as low as 3.1/ha reported.

Spring wheat: The estimated 2018 GB yield is 5.0-6.0t/ha, although there were reports of yields of up to 7.5t/ha on fields with very moisture retentive soil, whilst light land yields dropped to below 3 tonnes on occasion.

Spring Barley: The GB spring barley yield is estimated to be 5.2-5.3t/ha. This compares to a 5 year average yield of 5.8t/ha, so is a 9-11% reduction in yield.

Hot and dry weather facilitated harvesting.

Maize and Cereals all about 20% yield reductions [16]

Cereal yields were 13-17% down dependant on soil type and location. [12]

Soya yield was 39% down. [12]

We irrigated 50ha of wheat twice. [12]

The drought gave us access to extra yield which we wouldn't normally budget for – straw. As the ground was so dry we took the decision to bale the straw and capitalise on the strong demand for straw. This gave us an extra 75,000 of income. [12]

Mixed Farm. Arable/Livestock. Most crops suffered to a degree. [14]

Our straw yields were good in harvest 2018, which I believe demonstrates that we had done everything possible to enable the plants to grow to their full potential. However due to the dry weather at the end the ears simply did not fill sufficiently to give a corresponding high yield to the straw [15].

Winter wheat

Wheat 25% reduced yield [13].

Winter Wheat 10-15% reduced yield. Quality though was maintained. [14]

On the winter wheat the yield drop ranged from a 7% to 23% reduction to that of the 2017 harvest. The quality was also affected, with the specific weights being lower than required. [15]

Variety choice was important. It was felt that N American varieties were more tolerant of high temperatures [2].

Quality wasn't too badly affected either – proteins across all wheats were high. Specific weights were only poor on the very low yielding crops on sharp soils that had droughted out very early. One variety – siskin- has had slightly higher screenings than expected. Whether this was drought effect or not we aren't sure. [12]

Barley

Spring barley: Would usually receive a small amount of irrigation but this year priority was given to higher-value crops [2].

Winter Barley: 15% reduced yield but excellent quality. [14]

Our winter barley yields were surprising ok, but this could be because they ripen and harvest earlier than wheat and therefore the full effect of the drought and high heats did not have such an impact. [15]

Early harvested crops (e.g. winter oil seed rape) did better, due the water available from the wet spring [2].

Oilseed rape

Winter Oilseed Rape 20% reduced yield. [14]

Oats

Winter Oats 20% reduced yield [14]

Maize

Had to Irrigate maize for the first time in my farming career to keep it alive in Mid July [16]

costs

Input costs largely remained the same as the drought period affected the crops in the later stages when most costs had been incurred. [14]

Generally, input costs weren't affected too much. By the time the drought was "obvious" most inputs had been applied so it was case of just trimming back final fungicides on cereals. [12]

The input costs did not change by much [15]

Hardy nursery stock

Quite a lot of HNS are using groundwater, less than 25% as mains.

We have 10 sites within the business, but with 3 sites providing the bulk for production. Mostly self-sufficient in terms of water needs with high dependence on rainwater harvesting (RWH).

Rainwater collected off rooves, through permeable surfaces, diverted to reservoirs for storage. Reservoir footprint 3.5 acres. Chlorine dioxide used for treatment/purification. [10]

Last year was defined by the Beast from the East suspending a number of planned projects, affecting early season sales. [10]

Heatwave was responsible for high footfall to garden centres [10]

Plants responded to heat by maturing much earlier, but then having shorter shelf life [10]

2018 was quite different to 2012 drought which started earlier. If you can get through June-July with hort crops then usually OK [10]

Hosepipe bans a major issue for sector – there is a direct association of hosepipe ban with drought [10]

Need to look at landscape development projects and their vulnerability to drought orders, esp access to hand watering using hosepipes when turf is being established [10]

Viability of green walls in cities also needs to be considered – these are being widely promoted but how resilient are they to droughts and hosepipe bans? [10]

Utrecht model for green city being pushed but Local authorities and BALI need to do more to raise awareness of water related risks to their establishment/maintenance [10]

Flowers 25% less production with no water. [13]

Livestock

Livestock suffered from reduced grazing/quality of grass. [14]

The livestock suffered with their grazing. Lower growth rates in the store cattle and much reduced conservation of winter fodder. Probably 30-40% lower [14]

What (if anything) did you do to mitigate the impacts?

Irrigation management

Growers were irrigating 24/7. Night irrigation was not to save water, but to get around the farm in time [6 & 7].

Irrigation was a 24/7 operation. A lot of extra effort and diesel used. [13]

Didn't stop when conditions were windy as growers considered it more important to get some water on, than worry about uniformity [7].

Irrigation was priorities on higher-value crops [2].

Growers were divided as to whether it is better to fully irrigate part of the area or partially irrigate all of the area [1].

Everyone assumed that it would rain at some point, so they did not sacrifice any crop area, but kept irrigating everything, hoping for rain [6].

Where possible, irrigation was given to the sugar beet crop in mid-June to 'save' it, otherwise, there were fears that the entire crop could have been lost [1].

Increased Irrigation where possible but licences ran out! [3]

In 2018 we applied c300 mm on potatoes (12 inch plus) but normally 8-10 inches (200 to 250mm) in previous years [8]

Timing was critical in 2018, we had to starve other crops irrigation needs in preference to potatoes [8]

Peak requirements overlapped for potatoes and onions; normally they are out of synch and we're ok with meeting CRW with peak system capacity – not in 2018. They perfectly overlapped so we had seed planted onions doing nothing because we were on full irrigation on the potatoes for scab control [8].

As a consequence onions were seriously under-irrigated – having to fight the intense heat as well as the drought. Soil temps went up to 40°C [8]

We had to ration water across all the irrigated crops. It was like being in a 'lifeboat' and not knowing how many days you had to survive with a limited amount of water [11]

Irrigation scheduling

Rationing water across all irrigated crops. [11]

Growers were 'stretching' intervals but increasing the application depth, but this was not beneficial as crops were running out of water before the next irrigation [7].

Some growers use scientific scheduling, but many growers go by observation of the soil, or 'borrowing' information from scheduling services provided for potatoes. Providing soil water deficit estimates for beet growers would be helpful [1].

Get rid of the 'priority crop' mentality and ensure all crop needs are met. Losses from partial/incomplete irrigation so high now that it doesn't make sense to grow the crop unless you can guarantee the water needed to grow it. [8]

Irrigation equipment

Most growers did not have sufficient equipment to meet irrigation demand. Some invested in more equipment, e.g. pipes [2].

Some fields that weren't planned to be irrigated were brought under irrigation where water was available, but the cost of equipment, pipe, labour, etc. was high [6]

Most of the growers had irrigation available on the farm, but other vegetable crops (potatoes, carrots, parsnips) were prioritised for equipment and water, due the greater financial returns from these crops. Consequently, some of the crops were some partially, and some received no irrigation. Few were able to fully irrigate the sugar beet crop [1].

Some growers hired-in extra irrigation equipment (but there was high demand for equipment), or brought old equipment 'out of retirement' [1].

After June, it was very difficult to buy new equipment. Most new equipment comes from Europe where there was also drought and high demand [2].

We were up to the limit on most licences – made for some difficult decision we had to make partic early in the season. Infrastructure influencing decisions – spuds took priority. [8]

Now investing heavily in new upgrading of infrastructure to cope with short term simultaneous peaks in irrigation demand. [8]

Also building greater flexibility into system so we can take high flows from river in summer even if we're using the infrastructure for irrigation, need to be able to isolate section of mains for reservoir filling without impacting on irrigation [8]

We have gradually converted from overhead (spray) to drip on all our potato crop. We will now consider switching to drip on horseradish too [11]

Purchased an extra Rain gun mid-season. [13]

Water resources management

We should have rehearsed this scenario but hadn't so we got seriously caught out. Could have been much worse if all our reservoirs hadn't been full and we had a lot of water form groundwater which was a blessing [8]

One grower increased the capacity of his reservoir [2]

One grower re-instated a 'sleeping' licence [2].

Sites with limited water supplies ran out [9]

We used all our licensed allocation [11]

We were surprisingly OK, as ██████████ is uniquely secure in terms of water reliability. No major regional impacts on our businesses, but others elsewhere impacted severely by abstraction restrictions [10]

Flexing licences

The EA were proactive and gave an extra month of abstraction on winter licences (to end of March) [2].

Flexing licences / freeing up trading

- <https://www.nfuonline.com/ea-dry-weather-abstraction-briefing-31-july-18/>

Water trading

ESWAG growers traded licences [2]

There was some temporary trading of water among growers. For example, a water transfer scheme (Lincs) provided a 'reserve' of water that some licence holders were not using that was made available to others [1].

We were in touch with the EA about swapping a licence on a temporary basis. Which would have made a huge difference to our Tonnage. EA were not willing to listen to sensible arguments. It was ground water for 3 weeks with metres. [13]

<https://www.gov.uk/government/news/environment-agency-announces-support-for-farmers-during-dry-weather> (1 Aug – EA Press release on flexible support for farmers)

Aquifer management

The Environment Agency permitted some flexing of licences. This allowed abstractors to abstract from the limestone and use the sandstone aquifer for storage and re-abstraction [1].

Soil management

Growers were conscious of the benefits of increasing soil water retention on the Sandlands by not ploughing and adding organic matter (e.g. manure) to the soil [1].

We already operate a system that includes regular organic matter application to soils to aid water retention [15]

Harvesting

Non-irrigated crops were lifted first [1].

The mild autumn conditions facilitated late growth. ██████████ reduced the factory processing rate by 20% in the first few weeks of the season to allow the crop to stay in the ground longer and put on extra yield [1].

Cropping

Crop diversification is also a key option going forward – aim to reduce exposure to water risks by switching back to extensive rainfed cereal cropping. Going back to the 1940s type of farming [11]

Cover crops

Used cover crops to improve organic matter, fertility and soil moisture holding capacity [11]

Overwintered cover crops helped to increase water holding soil capacity and improve rooting of potatoes and beet [16]

Other

Other options include diversifying the business – more tourism related activities, glamping, adding value to the land we have. [11]

We trimmed back late season fungicide impacts slightly. [12]

Perhaps made more changes to the spraying regime, had we known the long the Drought was likely to last. [14]

Our growing area has [been] increasing had the trend of dry winter / spring weather for the last 5 — 10 years and therefore I had already changed my farming tactics. I no longer do any cultivation in the spring, any cultivations required must be carried out in the autumn. Drill straight in to the weathered soil and Cambridge roll asap. Drilling should be as early as possible in the spring to ensure the crop gets established well before any drought starts. On the autumn crops I have moved the first and second fertiliser doses in the spring forward as much as possible to allow for lack of rain later in the season. This year for example our first dose of nitrogen went on the 18th January. This really shows as other farmers in the area who waited for the traditional application date, now have wheat which is clearly more backward to mine. [15]

Perhaps reduced cattle numbers but the options for doing so were limited and the price achievable was much reduced as most people in the same position. [14]

On reflection, what could you have done that you did not do?

Couldn't have done any more [16]

Irrigation scheduling

Start irrigating earlier [2].

Should have started irrigating earlier. Growers waited too long to start [6].

Started irrigating cereals much earlier. Perhaps started irrigating beet a week or so earlier. [12]

More night irrigation, but labour is a constraint [2]

Should apply smaller irrigation depths, more frequently. Although this has a higher labour requirement, this is compensated by the positive effect on crop growth [7].

Irrigation equipment

Capacity

Should have invested in more irrigation capacity in the past [6].

Noticing subtle changes in weather patterns and need to be able to cope with short term intense periods of rainfall deficit. [8]

Many businesses have been compromising on irrigation investment – but not anymore. We hadn't moved on, but now looking long and hard at the resilience of our business planting programmes and water resources needed to meet contracts in a drought year. 2018 wake up call. [8]

Invest in more kit. Reservoirs, Pumps, Distribution pipes and hose reels. The return on investment is so difficult to justify for a one year in ten. [13]

Performance

Look to improve in-field equipment performance, e.g. replace guns with booms, but increases labour requirement (more moves) [2].

Drip

First year in 15 years that we didn't have trickle on potatoes (each year our area under drip was declining due to rising input prices and lower returns on crop, so we had to switch to cheaper irrigation) [9] Drip is an expensive insurance option that retail and supply chain not willing to pay for through raised farm gate prices [9]

Had some of the crop in under drip, but prices from retail/packers had limited that option at planting; they are not willing to help share the risks [9]

Going back to drip irrigation on 20% of the potato crop this year – need high quality on Maris Piper samples for new client [9]

Switch more crop to drip over time [11]

Water resources

Storage

Use high-flows early to keep the reservoir topped up. By the time they realised there was a problem, high-flows were no longer available [2].

We're max'ed out on summer water availability – only option is to build storage but investment in infrastructure first to cope with peak demand issues, then we'll look to increase storage capacity. Conscious that some reservoirs are still not full from winter period and extended HOFs during winter refilling period which is a concern. Winter water no longer the 100% reliable alternative [8].

We have been trying to get permission to build a reservoir for high flow storage but have been repeatedly turned down by EA [11]

Those with winter storage reservoirs are concerned about the possibility of restrictions on winter-filling [1].

Abstraction

Plant early (on suitable soils) and use water early in the season to avoid abstraction restrictions later in the season. Use it while you have got it [7].

Break the law and go over my licenced amount! [3]

Groundwater

Fortunately we have never been restricted from pumping from our 2 boreholes, we have a river pump which has restrictions on most of summer that we don't use currently [16]

Cropping

It is important to put the right crops in the right field in relation to variety (and drought vulnerability), water availability and soil type [6].

Be more realistic about the area of crop (that needs irrigation) that is planted [2].

Got away with our approach in the past, but not anymore. [8]

Acknowledgement in the [REDACTED] region that our historical ways of growing crops and managing irrigation were simply no longer viable; for years we had assumed we would get away with it, but 2018 changed all that [8].

Cultivation techniques to reduce runoff from irrigation and percolation below the tramlines [7].

We're also lengthening our crop rotations to reduce pressure on our land and water resource balancing. This helps take some pressure off our constrained water resources and releases spare water to irrigate a smaller area fully [8].

Changing land renting base – bringing in new land with larger water supplies [9]

Could have not planted so many potatoes on sand. [13]

We would have to target high value crops [13]

Look at long term weather reports. Modify spray regime to suit conditions. Grow more tolerant varieties. [14]

Improve pastures, although that is quite long term. [14]

Crop sacrifice scenario

If we run out of water, which of the poorest yielding fields can we sacrifice, to divert water to the highest performing crops, but maintain hierarchy of priority of pots, onions and parsnips [8]

What would you do if 2019 turns out to be as dry AND water resources are more limited?

“It would be a disaster” [2]

Growers would irrigate early in the season for fear that later they would be restricted from abstracting [1].

Think about trading early in the season [2].

We will pump more because we are in LEV conditions on our licences and will be going through an appeal process! [3]

Need to assume that it will be a dry summer and plan for that [6].

Make sure we start irrigating beet in good time to ensure that water reserves are in place as the crop needs it. [12]

Take a view on inputs based on crop condition and long range forecast. [12]

What do you think that others could do in such circumstances to help reduce the impacts?

Flexing licences

Environment Agency need to work with farmers to help them abstract as much water as possible. They are currently doing this by extending the abstraction cut off date to the end of April. [12]

The EA should allow more flexibility in licencing (e.g. changing abstraction points), earlier. There was a feeling that in 2018 the response was too late [1].

EA were too slow to respond to the farming challenges – currently 9 months to get a licence, needs to be nearer to 6 [9]

In [REDACTED], the EA are talking about allowing flexible abstraction after the end of March subject to no adverse environmental impacts and no downstream derogation [REDACTED].

The EA is out of control and needs to be recalibrated. Legally it should balance the needs of people business and the environment according to [REDACTED] but the balance has swung too far in favour of the environment and food production, people, business and livelihoods are badly impacted which will only export environmental damage to other areas of the world! [3]

Worried that EA centralisation will lead to loss of key local expertise and dialogue [9]

- <https://www.nfuonline.com/nfu-online/science-and-environment/irrigation-and-abstraction/ea-updated-flexing-abstraction-position-23-oct-18/>
- <https://www.nfuonline.com/nfu-online/science-and-environment/irrigation-and-abstraction/ea-briefing-on-flexing-of-abstraction-8-feb-19/>

Water resources

Need strategic reservoirs for agriculture and public water supply [6].

Maintain close comms with EA [REDACTED] – this relationship is absolutely critical – they understand our business need and the challenges we face from a WR perspective. It has highlighted how important trusted relationships are in this situation [8].

EA response generally too slow to cope with emerging issues, although local staff eg [REDACTED] provided excellent support to growers [9]

Taking a more risk-based approach to WR management rather than ‘precautionary principle’ approach which limits range of options available, particularly in a severe drought situation [8]

Ensure continuity of water supply. More water available for irrigation to safeguard supply of food. [14]

Groundwater

Greater flexibility in terms of ‘borrowing’ groundwater needs to be investigated [8]

Need to consider options of borrowing groundwater for short periods to support shortages in summer stream flows; that would have made a massive difference [9]

Requested EA to have some flexibility to use GW to pump into drains to support irrigation, but limited support. [9]

Estuaries

Growers see the amount of fresh water going to the estuaries as a ‘waste’. They appreciate the need for the environment, but question how much is actually needed and how resilience the environment really is [2].

Should be able to abstract water that is going to the sea – seen as lost water [6].

Supply chain

The supply chain needs to be aware of the impact of quality specification on growers [2].

Producer groups and packers have done what they can to utilise as much of the GB crop as possible and if they can do it this year then they should do it every year to avoid waste! [3]

In 2018 multiples reduces quality specification (e.g. potato size requirements) but growers felt it was too late. Many crops had already been harvested and rejected [2].

The retailers need to pay more money to the primary producers because food is too cheap in this country, if not there will be more cases of food not being available on the shelves like the lettuce shortage last year! [3]

Maintain close comms with supply chain – packers and processors – as situation evolves. Seek reductions in quality grade out and packing samples - communicate drought impacts to consumers quicker and explain impacts [8]

Collaboration

Most of our current strategies are based on building long-term resilience into our water supplies in the region through [redacted] related activities and strengthening the role of the [redacted] [redacted], and building trusted partnerships with [redacted]. [9]

Need to form abstractor groups to lobby for a share of water [7].

Need to continue to foster multi sector collaboration and start some local catchment scale interventions – building a large shared reservoir might be the end game but that will take 20+ years, we need some investment support and delivery of shared water infrastructure measures now. [9]

[redacted] are really starting to listen to farmers' needs and keen to collaborate. [redacted] has been exceptional in promoting this attitude within [redacted]. It's critical to start the 'conversation' with EA and WAGS. It's time to change the way we do things. Need to incentivise the water companies, EA and farmers to work together. [11]

The Broadland Grazing Scheme is an excellent example of how this can be done for mutual benefit. Need to work at the landscape scale and build on WRE benefits. BAWAG situation strongly influenced by the 'Catfield Fen' experience. British Gas example should be followed – they worked out how to work with farmers and pay them fairly for access to land etc. Similar approach needs to be developed with water companies [11]

Drought resistance / tolerance

Need better agronomic advice on water requirement, e.g. for scab control, and prioritising water among varieties [7].

Need to know more about the drought tolerance of different varieties [6].

Plant breeding for drought resilience [1].

Look at different foodstuffs that can be grown within the UK in times of drought [14]

If the dry weather trend continues, all we can do is look for more drought tolerant varieties from other countries such as Australia etc. [15]

Other

Better maintenance of waterways to reduce sedimentation and maintain flows [1].

More reliable medium-range weather forecasts [2].

There is still a high degree of complacency in the [nursery] industry – businesses need to seriously look at having sustainable reliable supplies, many still don't [10]

Flood attenuation dual purpose – many invested in these schemes but need to have multiple benefits, need more joined up thinking at the watershed level. How can businesses provide flood attenuation services in return for greater water reliability during summer droughts? [10]