Written evidence submitted by Henry Edmunds (Owner at The Cholderton Estate) (INS0047)

Westminster – UK Insect Decline and Food Security

Dear Members of the Committee,

Thank you for asking me to give evidence in your ongoing enquiry.

I have been asked to provide some written evidence and thank you for giving me the opportunity to do so.

The escalation of arable cropping, the loss of rotational systems and the intensification of grassland management, have all been critical and the fundamental cause of this decline. At the heart of this, lie the plethora of toxic chemicals aggressively marketed to farmers, enabling them to ignore the checks and balances which form the basis of a rotational methods, such as the "Alternate Husbandry" system which I follow.

This is a pan-European catastrophe, not solely limited to arable intensification. A few years ago, I visited southern Italy wishing to view the extensive and varied flora associated with the cultivation of Olives. Here, the grey barked trees of great antiquity, gnarled and protected by law, stand in serried rows as they have since Roman times. The ground flora associated with them; Lillies, Orchids, Tulips, Peonies and Tassled Hyacinth, formerly covered the ground in spring; an artists pallet of vibrant mixed colours. Today however this same terrain, even up the mountain sides and rock screes, are sprayed with glyphosate by migrant workers using knapsack sprayers. The Warblers sing there no longer. The land beneath the trees is bereft of insects and flowering plants. The Olives still stand but life has vanished from the groves. No longer can bees gather nectar from the flowers that have shrivelled away into the grey rocks. The only things visibly growing are the discarded plastic cans of 'Roundup'. Now, a further threat looms. Because all beneficial insects have been removed, a tree sucking Spittlebug is proliferating and is acting as an unchecked vector for the bacterial disease Xylella. This is killing multitudes of Olive trees and has had huge economic repercussions already.

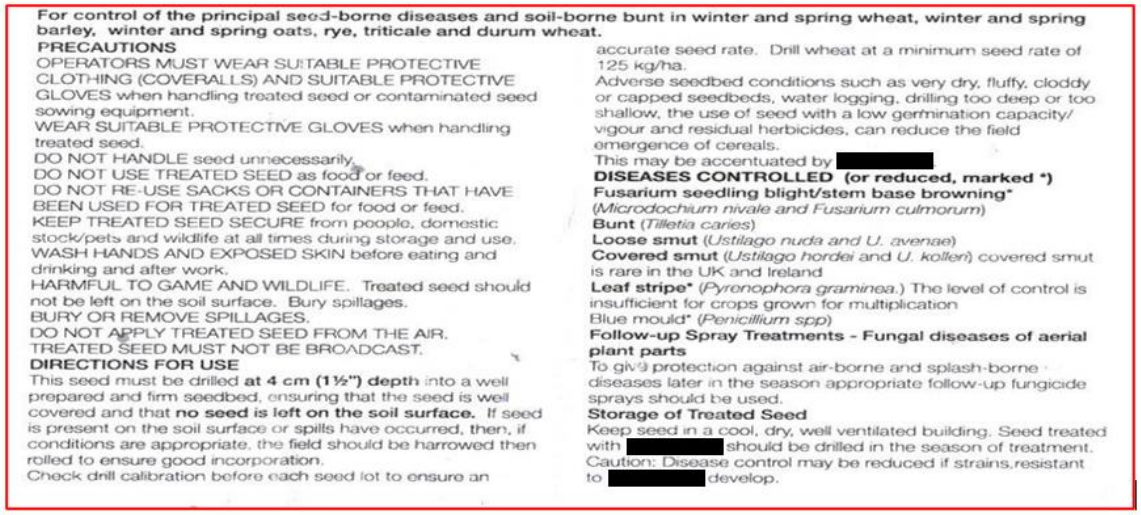
In the UK, the arable fields are treated with a great variety of chemicals, carefully developed to tackle persistent weeds such as Blackgrass and Wild Oats which plague intensive cereal crops. These pest species develop resistance to herbicides over time, necessitating the development of yet more aggressive chemicals. Arable fields may be sprayed 16 times in the course of a single growing season. On this farm, no chemicals are applied to the crops. As a consequence, it is apparent that many of the wild plants which share the arable fields with our crops are complimentary rather than harmful. Germinating in the autumn and growing over the winter, species like Red Dead Nettle, Germander Speedwell and Fumitory flower in the spring; thus producing feeding opportunities for crucial insect groups like Bumblebees. After flowering, these plants set seed for birds like Linnets and Skylarks and then fade away as the crop growth overwhelms them. The removal of these plants by herbicides represents just one of the many actions that have cumulatively destroyed the ecological back bone of the countryside.

Wild plants like Red Dead Nettle and Germander Speedwell thrive, ahead of the subsequent crop

On conventional farms, the use of chemicals starts with the seed which is supplied to farmers to grow the forthcoming crop. Each seed is covered with a thin layer of clay which carries chemicals designed to provide protection against a variety of fungal diseases. These chemicals are lethal to wildlife and to the people handling them. Warnings adorn each bag. Yet every field is sown with this treated seed. Inevitably, some will be picked up by finches, buntings and other small birds. It can be of no surprise that these birds are declining year on year and the once common species are now rare. Every field becomes a poison trap for seed eating birds.

This use of chemicals continues as the crop germinates and grows. Chemicals to remove young weeds as they germinate, chemicals to control fungal attack, chemicals to kill the crop itself before harvest and any surviving weeds that may still be there.

The countryside is now hostile to wildlife. There are no seeds for birds, no food plants for insects and hence no insects for the birds which feed upon them. The annual decline of Swallows and House Martins has become so severe that soon none may return to the nesting areas they have used for generations.



For control of the principal seed-borne diseases and soil-borne bunt in winter and spring wheat, winter and spring barley, winter and spring oats, rye, triticale and durum wheat.

PRECAUTIONS

OPERATORS MUST WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS) AND SUITABLE PROTECTIVE GLOVES when handling treated seed or contaminated seed sowing equipment.
WEAR SUITABLE PROTECTIVE GLOVES when handling treated seed.
DO NOT HANDLE seed unnecessarily.
DO NOT USE TREATED SEED as food or feed.
DO NOT RE-USE SACKS OR CONTAINERS THAT HAVE BEEN USED FOR TREATED SEED for food or feed.
KEEP TREATED SEED SECURE from people, domestic stock/pets and wildlife at all times during storage and use.
WASH HANDS AND EXPOSED SKIN before eating and drinking and after work.
HARMFUL TO GAME AND WILDLIFE. Treated seed should not be left on the soil surface. Bury spillages.
BURY OR REMOVE SPILLAGES.
DO NOT APPLY TREATED SEED FROM THE AIR.
TREATED SEED MUST NOT BE BROADCAST.

DIRECTIONS FOR USE

This seed must be drilled **at 4 cm (1½") depth** into a well prepared and firm seedbed, ensuring that the seed is well covered and that **no seed is left on the soil surface.** If seed is present on the soil surface or spills have occurred, then, if conditions are appropriate, the field should be harrowed then rolled to ensure good incorporation.
Check drill calibration before each seed lot to ensure an accurate seed rate. Drill wheat at a minimum seed rate of 125 kg/ha.
Adverse seedbed conditions such as very dry, fluffy, cloddy or capped seedbeds, water logging, drilling too deep or too shallow, the use of seed with a low germination capacity/ vigour and residual herbicides, can reduce the field emergence of cereals.
This may be accentuated by [redacted]

DISEASES CONTROLLED (or reduced, marked *)

Fusarium seedling blight/stem base browning* (*Microdochium nivale and Fusarium culmorum*)
Bunt (*Tilletia caries*)
Loose smut (*Ustilago nuda and U. avenae*)
Covered smut (*Ustilago hordei* and *U. kolleri*) covered smut is rare in the UK and Ireland
Leaf stripe* (*Pyrenophora graminea.*) The level of control is insufficient for crops grown for multiplication
Blue mould* (*Penicillium spp*)

Follow-up Spray Treatments - Fungal diseases of aerial plant parts

To give protection against air-borne and splash-borne diseases later in the season appropriate follow-up fungicide sprays should be used.

Storage of Treated Seed

Keep seed in a cool, dry, well ventilated building. Seed treated with [redacted] should be drilled in the season of treatment.
Caution: Disease control may be reduced if strains resistant to [redacted] develop.

Above: An example of the seed dressing industry warning labels showing chemicals used and their hazards.

How did we get to this state? The agricultural industry was driven to adopt these practices due to the mis-application of subsidies and the low returns from livestock production. It has been encouraged by the agricultural colleges pleading the cause of efficiency and technology and advised by agronomists who are remunerated on the basis of their sales to the farming sector. Farmers are advised to use chemicals that may not be necessary and are in reality forced into a system where they take all the risk for a very small return; whilst the agri-checmical companies gather huge profits. Once farmers are embedded in the intensive arable system, it is difficult for them to change. Thus, unless alternative drivers are introduced, the further decline of nature is inevitable. We will also pay a price as the food we eat will be more contaminated with agri-checmicals. It is difficult to quantify what affects this will have on our health, but if the expiration of nature is a guide, then the outlook is not encouraging.

These practices are only economic because the farming industry does not have to pay for the pollution caused by these actions.

Agri-chemicals now pollute waterways, drinking water and the atmosphere. There is little difference in the effects of insecticides and herbicides. One may kill wildlife directly and the other indirectly by killing the food plant or indeed the prey of another insect or bird or small mammal. All is inter-related.

Agri-chemicals go further. They destroy the essential components of a healthy soil as they leach through; the fungi, micro-organisms, all so fundamental to the continuing fertility of the land. These chemicals cause soil structure to break down and its moisture holding capacity is lost. Eventually, the soil will be blown away as dust or washed into rivers. A priceless resource is being constantly eroded away.

The more persistent chemicals like the neonicotinoids are highly mobile in the ground and are accumulated by flowering plants along field margins and hedgerows; to the extent that the concentrations of these are greater than on the treated crop itself. Thus, even the edges of fields become lethal for invertebrates (Prof. Goulson, University of Sussex).

As natural fertility has reduced, so the agricultural industry has become completely reliant upon nitrogenous fertilisers derived from the exploitation of fossil fuels.

As soil biomass deteriorates, the ability to retain nutrients declines. Of every ton of ammonium nitrate applied to crops in order to encourage growth, half is lost. One quarter to ground water and the other to the atmosphere (Prof Reay, Edinburgh University). Nitrate pollution of drinking water is escalating; forcing water companies to treat it or attempt to dilute polluted supplies from other sources. The ability to use this option is becoming more difficult and expensive treatment processes are becoming the norm. This is the direct experience of Cholderton & District Water Co. Ltd. The cost falls directly upon the consumer. Atmospheric nitrates, derived from agriculture, in the form the nitrous oxide gasses, are a major constituent of pollution, even in the heart of our major cities. This is particularly prevalent in the spring when rural applications of nitrate are partly responsible for the smog that blankets inner cities. Motor cars are not solely to blame.

Given that nitrous oxide is 300 times more effective in warming the atmosphere than carbon dioxide, it appears that the equivalent of some 100 million tonnes of climate changing gasses are released every year in the UK alone. Even this is probably an underestimate.

The situation is dire but there is a solution to the loss of biodiversity and natural fertility. What is required is the resurrection of a mixed farming system utilising rotational leguminous herbal leys as the cornerstone of a new farming technique. This is a revised version of the practices that have fed humanity for centuries and allowed it's co-existence with the natural world.

There are urgent criteria that we must observe. These are the basics of good husbandry. Every farming operation should consider the future of the land, our most precious resource. We need therefore to build organic matter levels in the soil, to generate nitrogen naturally by the use of leguminous plants and to remove pernicious weeds by rotational practice.

Leguminous Leys – Lucerne, Red Clover and Bird's-foot Trefoil

On this farm, I use leguminous leys as a fertility building operation. They are left in situ for 5 or 6 years and over this period build organic matter in the soil and generate substantial amounts of natural nitrogen. Leguminous leys require no ammonium nitrate fertiliser yet will out yield the standard Rye Grass ley which is currently in vogue. These can receive as much as 300 units of N per acre per annum at vast expense. The use of artificial nitrogen on grassland should be curtailed as soon as practically possible and farmers educated about legumes and their effective use. Legumes will grow on most soils, it is just a matter of choosing the right mix incorporating the correct grasses for the particular farm in question.

Organic matter (OM) is the vital stabilising element of the soil. It retains moisture, nutrients and the essential microbial elements which are crucial to achieve a sustainable farming system. This living element of the soil contains bacteria, viruses, fungi, protozoa, algae, earthworms, insects and their larvae and larger animals like moles. It is the interaction of soil fungi and these other organisms with the roots of agricultural crops which are so critical for fertility and hence, yield.

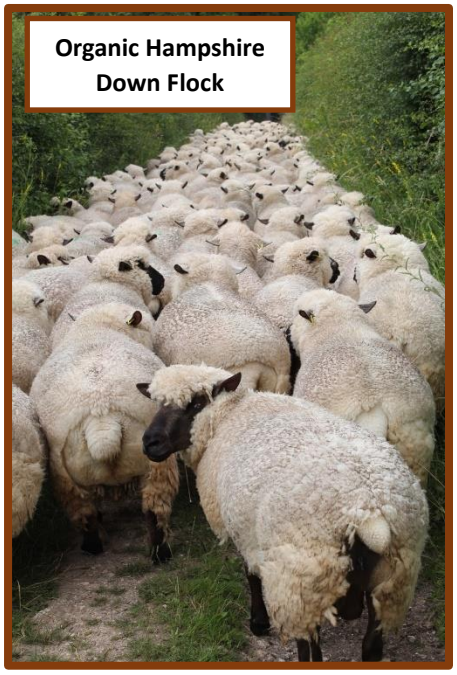
This is where the concept of rotation is so important. Leguminous herbal and grass crops (leys) will enrich the soil year by year. This is due to the decomposition of leaves and roots, by the manure of grazing animals and by the nitrate generating rhizobia in the root system of the legumes. After 5 or 6 years, this ley can be inverted by the plough and its fertility utilised to grow cereal crops. The extended life of this ley will remove the most persistent and troublesome weeds, without recourse to chemical intervention.

The benefits to the wider environment now become obvious. Soil OM levels are increased, carbon dioxide sequestered from the atmosphere and crops grown without any form of chemical intervention. But, because this is a rotational system, as one field is ploughed, so another is put down to the leguminous herbal mix and biodiversity thrives. The legumes used here are Lucerne, White Clover, Red Clover, Birds Foot Trefoil and above all Sainfoin. All these species are attractive to insects but Sainfoin is the highest yielding nectar and the deepest rooting plant of all of these.

Sainfoin at Cholderton – the deep rooted and nectar rich legume

The solution to the loss of biodiversity, caring for our soils and long term food security lies in the adoption of a truly rotational system, utilising leguminous rich leys. One could ask ‘how could such a system produce enough food for our own population?’. As Vicki Herd (MSc FRES Wildlife trust) stated, this is a matter of reducing food waste and concentrating on a wider diversity of temperate climate crops. We all need to change our eating habits and this can be achieved through education. We must utilise seasonal crops, not rely on the importation of unsustainably grown food from other parts of the world. With shipping accounting of 30% of global green house gas emissions, this should

be rapidly reduced. Such an approach will help to develop a better rotational husbandry with cruciferous crops, enabling a break interval with cereals. In this complex rotation, the use of leguminous leys will be of paramount importance, bringing back as they do structure and nutrients to depleted soils. Cattle must be released from the sheds and returned to the fields on an extensive grazing basis. These animals, rather than being labelled as dangerous methane producers, should actually be seen as aiding the bio diversity recovery and as soil fertility generators.



Cattle and sheep thrive on these leys. Animals from this farm achieve the highest prices in Salisbury Market despite them competing against animals that have not been reared organically.

Our cattle sequester more carbon through grazing these pastures than they excrete into the atmosphere. This is achieved because they are fed entirely on sustainably produced home grown crops, not on feed stuff imported from other areas of the world. Part of their ration is Sainfoin and this itself reduces methane emissions in cattle by some 30%. This rotation will remove pernicious weeds, build soil fertility, sequester carbon and can eliminate the need to use pesticides and herbicides. Fungicides are never required here because healthy soils protect the growing plant.

The last few years have seen some very dry springs, yet despite this, our spring crops have flourished because of the nutrient availability and water retaining capacity of the soil.

Herbal Leys are very easy to establish and come into full production in the summer of the year following their original establishment. I generally under-sow Spring Barley with the new seeds mixture or wait until the autumn and establish the new ley in the stubble of the previous crop. This will strengthen over the winter, can be grazed in the spring and will produce a full crop by the late summer or autumn. From then on a very high output will be maintained for at least 5 or 6 years.

It takes 10lbs of organic material to form 1lbs of stable OM in the soil. Taking a baseline of 4% OM; which is average for UK arable farms; the OM levels here have been increased by 5.6% to reach a current average of 9.6%. this indicates that by way of plant roots, decomposing residues including manures, 560 tonnes per ha or 230 tonnes per acre of organic material have been generated by rotational leys incorporating legumes over a period of time.

Due to the activities of soil fungi and their interaction with the growing crop, each 1% of OM releases 20 to 30 lbs of nitrate, mainly over the summer. This explains how successful crops can be grown without recourse to artificial nitrate applications. This natural nitrate is released in a symbiotic interchange between fungal mycelia and the roots of the crop, which also ensures no nitrate is lost to ground water. This is a truly sustainable approach to cereal growing.

Nectar rich spring weeds give way to a thick crop of oats as part of the rotational system at Cholderton

In conclusion, I would suggest that the following measures are implemented:

1. Every field should have a 6 meter leguminous herbal mix incorporating native grasses, planted around its perimeter. This should be mandatory. The benefits to all wildlife including insects, ground nesting birds etc would be incalculable.
2. The extensive planting of hedgerows, particularly in landscapes that have been denuded by the pressures exerted by industrial farming. Many farmers have little understanding of the ecological value of hedgerows, despite these being a refuge for beneficial insects and other wildlife over the winter. For example, Carabid beetles rely on hedges to provide their winter quarters. In the spring, they move out into the crops and eliminate slugs. These beetles are however themselves wiped out by pesticides. There is an urgent need to address these issues and this can be achieved by education and eliciting the support of the nature loving community to encourage farmers to undertake routine tasks like hedge trimming, with more sympathy.
3. The use of treated seed for arable crops should be stopped. This is poisoning wildlife and if a treatment is truly necessary, it should be totally benign to the environment.
4. The principle of the leguminous rich herbal ley should be embedded within the arable rotational cycle, thus ensuring that every field is given a resting period where it can be grazed for at least 4 years. This will break the stranglehold of pernicious weeds like Blackgrass, reduce pesticide applications and recover a degree of soil fertility.
5. Under the auspices of the excellent Countryside Stewardship Scheme (CSS), a collaborative relationship between the farming community, Natural England (NE) and DEFRA, farmers can deliver secure, sustainably produced food. Some of the priorities that I have outlined are currently being addressed by NE within the CSS scheme. This brilliant programme offers farmers many alternative ways in which they can work to improve the natural environment for the benefit of all. For example, the leguminous herbal rich leys qualify for the scheme as the GS4 option. There are many options available which include field margins (AB8), hedgerows (BE3) and low input cereals (AB14). The latter encourages the husbandry of cereal crops without fertilisers nor herbicides. I would recommend that this option is slightly

adjusted to include combination crops like oats and vetch. These reduce our dependence on imported protein and act as a valuable habitat for wildlife as well as a break crop from cereal monoculture. Natural England should have sole control over the running of this scheme and making the payments associated with it. No other government department has the necessary experience and resources to achieve this in a way which would be satisfactory to the farming community.

6. An expansion of amenity tree planting on farms with an emphasis on restoring the many small woodlands that were destroyed on farms after WW2. NE are well placed to advise on this and implement schemes, working as they do, with the Forestry Commission.
7. A return to extensive grazing by cattle and sheep across the countryside will generate employment and eliminate our current need to import these products, thus reducing carbon emissions engendered by shipping. More small abattoirs will be required and more licensed slaughtermen who travel from farm to farm. Currently, meat inspection regulations are too convoluted and complicated. This should be simplified. It is surely not necessary to have licensed vets inspecting carcasses when the same could be achieved adequately by individuals who have been trained in a more specifically targeted way.
8. There needs to be an agreed methodology for trading carbon so that carbon sequestration on farms can be recognised and rewarded. Every farm should undergo a carbon audit. There is an outstanding potential to utilise UK farmland as a carbon store. There are approximately 28,000 square miles of pasture and 25,000 square miles of crops in the UK. If stable organic matter levels were lifted by 1%, this would be equivalent to 5824 tonnes of OM per square mile. A 1% increment in soil organic matter could sequester 309 million tonnes of carbon. This compares with total UK emissions in 2022 of 417 million tonnes. This demonstrates that incorporating the techniques that I have suggested could have a dramatic effect on overall carbon sequestration and make a massive contribution to reaching carbon equilibrium and meeting all our climate targets earlier than has been suggested by government.
9. The use of pesticides must be reduced; this can be achieved by the “Alternate Husbandry” system and by encouraging biological control measures. Given the extreme level of destruction meted out by glyphosate, its use should be severely curtailed.
10. The application of nitrate fertilisers to grassland should cease. The natural advantages of leguminous forage crops incorporating grasses must be exploited. Further reductions of nitrates can be achieved in arable cropping by utilising “Alternate Husbandry” rotations.
11. Currently, TB in UK herds of cattle is barely controlled, causing huge trauma in the rural community and expense for both the tax payer and farmers. Bovine vaccination for TB should be implemented immediately.

Working with NE and DEFRA, the farming community should abandon the pursuit of monoculture which has been achieved at the expense of all other living creatures. It should harness the power of biodiversity rather than suppressing it. Regenerating the microbial health of our soils is paramount in both securing sustainably produced food and restoring nature.

Henry A. Edmunds FRES

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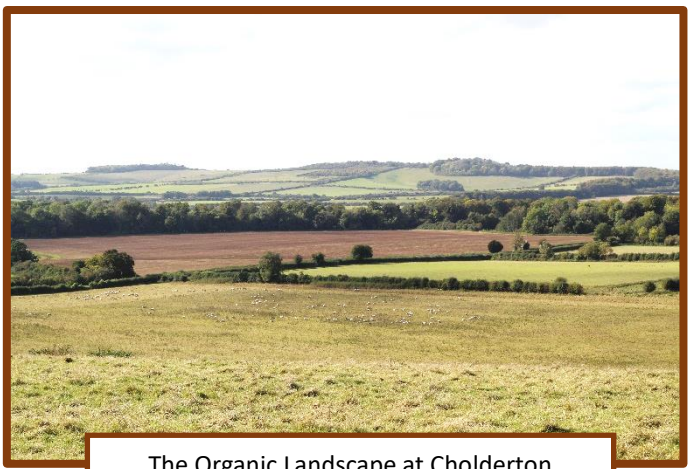

The Organic Landscape at Cholderton