# Grower Summary

## FV 426a

Brassicas, leafy salads, oilseed rape and legumes: Developing and evaluating management strategies to mitigate woodpigeon *Columba palumbus* damage to crops

Final 2018

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| **Project title:** | Brassicas, leafy salads, oilseed rape and legumes: Developing and evaluating management strategies to mitigate woodpigeon *Columba palumbus* damage to crops |
| **Project number:** | FV 426a |
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# GROWER SUMMARY

## Headline

Current woodpigeon management practices can be enhanced through a more strategic approach that incorporates lethal and non-lethal techniques, with growers cooperating and coordinating control activities at the landscape-scale. At the field-scale, both audio-visual deterrent techniques reinforced with live shooting and an automated laser independently reduced woodpigeon grazing and crop damage on brassicas. Lower crop damage was associated with greater crop head size and a higher percentage of plants harvested at first cut. At the landscape-scale, coordinated shooting focussed on pest removal can remove woodpigeons at a greater rate than intermittent shooting at the level of the individual holding or sports-shooting focussed on individual patches and bags.

## Background

The woodpigeon *Columba palumbus* is recognised as a major agricultural pest in the UK, feeding on a range of arable crops including horticultural brassicas, leafy salads, oilseed rape and legumes. In addition to reducing yield, woodpigeons can impact on the harvesting schedule and also diminish the appearance and eventual saleability of produce. Existing woodpigeon management practices, across all crops, are frequently ineffective and often costly, particularly for high value horticultural brassicas. There is an extensive range of bird deterrents and management strategies deployed by growers, however evidence for their effectiveness is often lacking or is largely anecdotal. The current research project focussed on evaluating and developing management strategies that integrate the most promising deterrent techniques (current and novel) and other measures (e.g. shooting) – taking forward the current knowledge on woodpigeon management reviewed in FV 426.

This final project report details field trials undertaken in the final year (2017-18) and draws together the findings across all three years of the project.

## Summary

### *Reinforced deterrents*

- The effectiveness of visual and auditory deterrents (life-like mannequins, gas cannons and rope-bangers), reinforced with periods of live shooting by marksmen dressed identically to the mannequins, was evaluated in a series of 10-week field trials.

- Preliminary field trials (2015-16) on autumn-sown brassicas (life-like mannequins and gas cannons) with reinforced shooting showed that the effectiveness varied markedly between fields, from very effective to ineffective.

- Subsequent field trials (2016-17), with a modified deployment of the deterrents, compared woodpigeon grazing and crop damage between two groups of brassica fields (broccoli and cauliflower): Group 1 (treatment) received visual and auditory deterrents (life-like mannequins, gas cannons, rope-bangers) reinforced with live shooting (concentrated in the first two weeks); Group 2 (controls) received no deterrents other than those deployed by growers.

- A total of 15 fields were used: 7 treatment and 7 control; one further field was split into a treatment half and control half. Fields were arranged into six study groups based on their proximity and ownership; each study group contained both treatment and control field/s.

- In all fields crop damage measurements were undertaken at the initiation of the trial (prior to, or as near as possible to, the onset of woodpigeon grazing) and at 2-week intervals throughout the trial. Observations of woodpigeon activity were undertaken on all fields.

- In five of the six study groups, on Group 1 fields (treated): woodpigeon numbers and the time they spent on fields was lower; and the proportion of plants suffering high grazing damage was lower, compared to control fields.

- At the end of the trials, the median change in the percentage of plants scored as having high damage on treatment fields was a decrease of -30% to -38% compared to an increase of +27% to +43% on control fields (values dependent on sample groups).

- At harvest, the head size of mature plants was greater; and a higher percentage of plants was cut on first pass in areas of fields suffering low damage compared to areas receiving high damage.

### *Shooting – population management*

- The effectiveness of shooting and impact on woodpigeon abundance within an 8,200ha area in Lincolnshire was evaluated over a 10-week period April to mid-June 2016.

- There were four categories of land with: (i) shooting undertaken by APHA staff only, (ii) shooting undertaken by APHA staff and landowner appointees, (iii) shooting undertaken only by landowner appointees, and (iv) no shooting. Landowners/growers provided shooting returns - this included a number of returns from land outside the study area.

- A total of 2137 woodpigeons were reported shot, 1575 within the study area.

- Of the 2137 woodpigeons reported shot, APHA marksmen accounted for 955 (45%) (60% of the 1575 shot within the study area). Of the 955 woodpigeons shot by APHA marksmen 57% involved shotguns and 43% air rifles.

- Numbers of woodpigeons observed in the study area decreased from a mean of 1661 in the first two weeks of April, thence remaining relatively steady over the following 8 weeks fluctuating around a mean of 728 (387-1386), i.e. there was not a continuous decline in woodpigeon numbers over the trial.

- There was little apparent cooperation between neighbouring growers, with individual growers restricting shooting effort on their land to vulnerable periods in the growing cycle of their own crops. An effect of this approach is that, outside of periods when vulnerable crops are available, woodpigeons have access to holdings that serve as safe havens.

- For sport shooting, the spatial and temporal distribution of the reported hunting appeared to be dictated by the convenience and protectionism of shooters' 'patches', with the onus on ensuring good days' bags for those with shooting rights; access to hunt by others being denied. An effect of sport shooting is that during the period between successive shoots, woodpigeons have access to holdings that serve as safe havens.

- Sport shooters were also resistant to what they perceived as overly intense shooting management (e.g. roost shooting with air rifles and night vision), seeking to retain healthy populations for sport.

- The current approach to shooting woodpigeons in the study area was not consistent with maximising population management; with implications for overall crop protection. Effort focussed at the scale of the needs of individual holdings and the aspirations of sport shooters constrains the overall impacts of wider control. A more effective

approach to population management would require greater cooperation between growers and a strategic approach focussed at the landscape-scale.

### *Shooting – field scale*

- The limited data gave some indication that at the field-scale, shooting (shotguns over decoys) reduced the numbers of woodpigeons utilising the immediate area (radius 250m) around a shooting site.

- Although, in most cases woodpigeons returned to the field in less than five days following the shooting session, their numbers were markedly lower (by an average of 73%).

- Caution needs to be taken, however, in drawing conclusion from these observations.

- Monitoring of woodpigeon numbers in the study area was designed to evaluate the effects of shooting at the landscape-scale, not at the field-scale. Therefore, it is not known how reliable field-scale counts were in respect to actual numbers of woodpigeons before and after shooting sessions.

- A robust evaluation of the effects of shooting at the field-scale requires a monitoring protocol based at the scale of the shooting sites.

### *Hand-held laser – roost dispersal*

- A small-scale investigation (January 2017) tested whether a low-powered, hand-held laser could disperse woodpigeons from a habitual winter night time roost.

- The trial involved three sequential one week phases (pre-treatment, treatment, post-treatment) with a laser deployed at a roost at dusk on each of five consecutive evenings during the treatment period. A second untreated roost 6km away was simultaneously monitored for comparison.

- Complete (or near complete) dispersal was achieved by the end of the five consecutive evenings of treatment; the effect increasing incrementally over the treatment period.

- Roost dispersal was short-term, however, with numbers in the roost showing full recovery over a five day period post-treatment. This highlights the need for subsequent periodic use of the laser to maintain deterrence.

- During the five-day treatment, numbers of woodpigeons in the area surrounding the roost (1km radius) increased at a lower rate than around a similar untreated roost.

### *Hand-held laser – field scale*

- A small-scale investigation tested whether low-powered hand-held lasers (a small 'laser-pointer' type and a larger, commercial 'bird-scaring' laser) could reduce woodpigeon grazing on a field of winter cabbage.

- Over a five week period, the lasers were deployed onto the field from a vehicle from the field edge, two to three times per week at different times of the day, but focussing around early morning and late evening when the laser was most visible.

- Both lasers consistently lifted grazing woodpigeon flocks off the field from up to a distance of 300m.

- Although the lasers were consistently successful in lifting woodpigeons this was short-lived with birds (original and/or new arrivals) often repeatedly re-landing in the field, usually at a greater distance from the source of the laser.

- Numbers of woodpigeons recorded on the field remained largely unchanged throughout the treatment period.

- It cannot be ruled out that a more frequent and persistent use of the laser would have a cumulative and longer-term deterrent effect.

### *Automated laser – field scale*

- The effectiveness of an automated laser was tested in a cross-over experiment on two fields of autumn-sown sprouts. Field 1 was treated with the laser and the second field (Field 2) left untreated (control). After four weeks the laser treatment was switched between fields and the trial run for another four weeks.

- Over the initial four-week period, crop damage increased on both fields but was markedly lower on the laser-treated field (+9%) than on the control field (+89%). Switching of the laser between fields reversed these trends – crop damage decreased markedly on the now protected Field 2 (previously control) (-74%) and increased on the now unprotected Field 1 (previously laser-treated) (+33%).

- During monitoring periods over the initial four-weeks, only a single woodpigeon was recorded on the laser-treated Field 1, whilst control Field 2 received flocks of up to 86

woodpigeons. Following switching of the laser between fields, on the previously laser-treated Field 1, woodpigeons were now recorded in each observation session, up to a flock size of 183 birds. On Field 2, woodpigeon grazing continued although with smaller flocks. This apparent contradiction of continued woodpigeon grazing and yet marked decrease in crop damage across Field 2 appeared to be due to the topography creating small laser blind-spot areas, in which woodpigeons continued to graze.

- The results are consistent with a deterrent effect of the automated laser. Some caution is required, however, due to confounding variables - oilseed rape and peas in fields neighbouring Field 1 may have contributed to attracting woodpigeons away.

- Further replicated trials of the automated laser are required to confirm the magnitude and duration of the deterrent effect and also to refine its deployment in terms of optimising the siting and laser pattern of the device.

### *Drone*

- A small-scale investigation tested whether flying an unmanned aerial vehicle (drone) could deter grazing woodpigeons from a field of brassica.

- Over three sequential days a drone was flown 37 times in response to flocks of woodpigeons (20 to 160 birds) landing in the trial field (13.2 ha).

- The deterrent effect of the drone was very short-term: woodpigeons flying from the field at the approach of the drone, and taking refuge in nearby trees or hedges; the median distance flown was 300m (100-420m).

- On 100% of occasions woodpigeons returned to the field; median time to return was <20 minutes (<3 to <45 minutes).

- There was no difference in the overall pattern of woodpigeon activity (median numbers of woodpigeons; and percentage time on field) on the treatment field (drone) and a similar control field (without drone) during pre-treatment, treatment and post-treatment periods.

### *Management strategy*

- Current woodpigeon management practices can be enhanced through a more strategic approach that incorporates lethal and non-lethal techniques, with growers

cooperating and coordinating control activities at the landscape-scale, across ownership boundaries.

- At the field-scale, both, audio-visual deterrent techniques reinforced with live shooting and an automated laser can independently be used to reduce woodpigeon grazing and crop damage at the field-scale.

- The use of shooting to reinforce deterrents should be concentrated in the first two weeks post-deployment of deterrents; with shooters reintroduced if necessary.

- When deploying an automated laser careful consideration of field topography is necessary in order to minimise laser blind-spots, which can continue to attract woodpigeons.

- Low-powered hand-held lasers can be used to alleviate grazing in the immediate term, whilst longer-term deterrents are installed. Lasers can also be used to disperse woodpigeon roosts with potential associated decrease in woodpigeon activity in the area around the roost.

- At the landscape-scale, coordinated shooting focussed on pest removal can remove woodpigeons at a greater rate than the episodic shooting associated with control at the level of the individual holding or sports-shooting focussed on individual hunting patches and bags. A dedicated full-time woodpigeon controller would facilitate control over large areas of contiguous land. Cooperation between a series of consortiums of local growers each with their own full-time woodpigeon controllers would enable strategic and coordinated management at the landscape-scale.

## Financial Benefits

The median cost of deploying reinforced deterrents for a period of 10 weeks was £30 per ha. Average yield and farm gate price (2016) of the crops under consideration were: calabrese 9.7 tonnes per ha and £512 per tonne; cauliflower: 9.2 tonnes per ha and £579 per tonne (Defra data). The financial value of 1% of the crops is equivalent to £50/ha and £54/ha respectively. Thus, on average, reinforced deterrents are cost-effective if their deployment results in a reduction in yield loss of 1%.

The cost-effectiveness of an automated laser relies on a number of assumptions. A laser costs in the order of £10,000. Although this represents a significant outlay, this cost will be offset by the working life of the device (likely minimum of 5 years), and the area over which the laser is effective. In terms of area of effectiveness, the laser will easily cover the whole of

a 20ha field (depending on topography) and the portability of the device facilitates movement between different fields in response to developing woodpigeon grazing pressures. Therefore, if protecting only two 20 ha brassica fields annually for 5 years, the unit cost of deployment is equivalent to £50 per ha. This compares to an average financial value for the crops as above.

## Action Points

- A combination of visual and auditory deterrents (life-like mannequins, gas cannons and rope bangers) reinforced with periods of shooting (marksmen dressed identically to the mannequins) can reduce woodpigeon grazing and crop damage on fields of brassicas.

- An automated laser can reduce woodpigeon grazing intensity and crop damage levels. The laser has to be positioned with due consideration to field topography to minimise laser 'blind spots'.

- A low-powered, hand-held laser can lift woodpigeons off fields of crops from up to a distance of 300m. Persistent and repeated use of the laser is necessary for anything other than an immediate, short-term effect.

- A low-powered hand-held lasers can disperse woodpigeons from a traditional night roost, and potentially reduce the build-up of woodpigeons grazing fields in the area around the roost. Persistent and repeated use of the laser is necessary for anything other than an immediate, short-term effect.

- Shooting woodpigeons should be undertaken strategically at the landscape-scale through coordination with neighbouring landowners, rather than focused on the preferences of individual growers and shooters.

- Licensed shooting of woodpigeons at night roosts using air rifles and night vision is an effective additional removal technique to traditional shotguns over decoys.

- Use a strategic overall management approach that incorporates lethal and non-lethal techniques, with growers cooperating and coordinating control activities at the landscape-scale.