KTIF Final Report Template

Contents:

1. PROJECT TITLE/APPLICANT (SCOCAN KTIF Ref 030-2019)

1.1 Title: SCottish Organic CANola (SCOCAN)

1.2 Overview of your company

SRUC is a knowledge-based organisation, supporting the development of land-based industries and communities. SRUC provides advanced education and training, R&D, advisory and consultancy work on an extensive range of subjects but with particular emphasis on food, land and the environment, rural resource and business management. SRUC has a strong reputation for co-ordinating and delivering projects on a wide range of topics and scales. SRUC has in-depth knowledge and experience in the competencies required for this project, and their core input to SCOCAN is based around the experience and capability of key staff with a strong track record of novel crop agronomy and organic production systems.

Other members of the Operational Group include David McClelland from Norvite, a feed manufacturer with a relatively newly established crushing plant near Oldmeldrum in NE Scotland, so they have an interest in the oil and meal extracted from organic oilseed rape for their feed business, as well as the oil for human use; Mr Andrew Cheetham from Ceres Agri-Services is an independent agronomist with many years experience providing advice to clients including soils and organic crop production; Ed Smith from Scottish Organic Producers Association (SOPA), an organic certification body with an interest in the potential to broaden their clients' cropping options and incomes; the five farmers in the Operational Group include Gordon Whiteford (Fochabers), Murray Cooper (Oldmedrum), Chris Gospel (Strichen), Bruce Irvine (Fraserburgh), Dougal Baird (Angus) and all have mixed farms. The Operational Group's role was to discuss the general development of the project as it progressed, key areas to focus on with regard to the cropping options at each farm and what aspects and level of detail should be covered in the farm events and other KE materials.

2. EXECUTIVE SUMMARY

2.1 Overview – Maximum 1 page

The SCOCAN project achieved its main objective of developing and demonstrating a range of suitable approaches that can be employed to successfully produce organic canola (oilseed rape) in Scotland. Yields averaged just over 2.5t/ha, with the best achieving just over 3 t/ha – not far off many conventionally grown crops in the area for the same season, but with far fewer inputs. Scottish national oilseed rape average yield for 2020 (based on Scot Gov census) was just under 4 t/ha, but within that yields were very variable, and mirrored the experience of the SCOCAN farms. This was anecdotally linked to greater flea beetle damage in many of the conventional crops and also reduced effectiveness of glyphosate on conventional crops compared to swathing which was used on all of the organic crops. Oil content was between 41 and 43%, and erucic acid levels were all well below the 2% level required for human use, which meant

the seed could be sold at a 25% premium over that destined solely for livestock nutritional purposes. This project utilised 5 farms, 3 of which were used specifically as pilot study farms and hosted 3 on-farm events or "virtual tours" during the course of the project at key points in the season; (a) leading up to early establishment, (b) leading up to flowering and pod formation, and (c) leading up to and including harvest. Focussing mainly on the 3 pilot-study farms, a range of agronomically important information was collected allowing some benchmark comparisons to be made on the different approaches used to grow the oilseed rape crop organically. This included point in the rotation, varieties, establishment methods, nutrition / fertility, weed control, disease and pest issues, harvesting approaches, yield and quality and volunteer control approaches. The pilot study demonstrations were never intended to be replicated across farms, or within fields and covered only one season, so some caution needs to be taken when interpreting the results and conclusions. All of the 5 SCOCAN organic farmers are growing the crop again, most of them on an increased area, and to our knowledge, they have been joined by another 5 farms in Scotland which indicates an increased farmer confidence in growing the crop. The formation of the Operational Group was a useful way to facilitate discussion between the organic farmers growing the crop, as well as the other stakeholders (agronomist, researcher, feed/food processor and organic certification body) throughout the duration of the project. This was achieved through a range of methods, including face-to-face meetings (pre Covid19), a WhatsApp group, emails, confertels, phonecalls and video calls (TEAMs, ZOOM and Go-to-Meeting). A range of approaches were used to disseminate the benefits of the project to the organic industry throughout Scotland, the UK and EU through a wide range of articles, press and TV coverage, social media, presentations at KT events and this final report. The legacy of the project is that there are now a set of grower guidelines (here) aimed at Scottish farmers who can adapt these to suit their own organic farms, as well as 3 on-line videos (here, here and here) that provide additional information from the agronomy and research team involved, as well as, and perhaps most importantly including direct feedback of the experiences of the farmers that grew the crop as part of the project.

3. PROJECT DESCRIPTION

The project aimed to demonstrate the viability of growing organic canola (oilseed rape) under Scottish conditions (soils and climate) in order to open up a new and potentially lucrative source of income for organic farmers and processors, by providing alternative, locally produced livestock feed or feed supplements, as well as offering a potential for supply to even more valuable human markets. A key part of the project involved members of an Operational Group involved in broader project direction and delivery, supported by a smaller sub management group involved in the more day to day planning activities associated with the project, especially leading up to delivery of farm events, whether held physically or virtually. The Operational Group consisted of 5 organic mixed farms that grew the crop including Gordon Whiteford (Fochabers), Murray Cooper (Oldmedrum), Chris Gospel (Strichen), Bruce Irvine (Fraserburgh), Dougal Baird (Angus), an independent agronomist (Andrew Cheetham from Ceres AgriServices) who provided agronomic advice and, data collection from farms and input to KE activities, a feed/ food processor (David McClelland, Norvite) who purchased the seed from the farms and will market the products, an organic certification body (Ed Smith, SOPA) that helped to provide publicity and act as a conduit for interested parties to be put in touch with specialists along the production chain and a researcher (Dr Robin Walker, SRUC) who administered and facilitated the delivery of the overall project, and also had a key role in delivering the KE outputs. As a group, they were tasked with facilitating the direction the project took within the remit of the grant. These activities encompassed the development of practical approaches

to successfully grow organic canola (oilseed rape) in Scotland in part utilising 3 pilot study on-farm demonstration events to showcase this. Each event was designated to take place at a different pilot study farm and at a different strategic point in the crop's development over the 2019-2020 season. These events were the primary routes through which discussion with other farmers and interested parties were channelled, including opportunities to provide feedback into possible treatment options that could be applied to the demonstration fields on the 3 pilot study farms' crops for comparison later in the season. These events were also used to provide video footage and pictures in addition to the core data and imagery being collated as part of the project from the pilot study farm demonstrations and these were used to provide snapshots of the crop and its management at key points during its lifespan in the form of informative videos which have been made available online and can be found here, here and here. Success of the SCOCAN project can be measured in terms of the group having developed at least one approach to producing viable organic canola (oilseed rape) crops in Scotland and a set of grower guidelines have been produced to showcase this and can be found here. Success can also be measured by the wider uptake of the crop by organic farmers in Scotland (already started to take place), and the rest of the UK and countries with similar climates in the future. This can be linked to increased processing volume of organic canola by Norvite (and perhaps by other processors).

4. FINANCE

4.1 Sum awarded: £29,983

4.2 Detail of spend:

This project was 100% funded by SG/EU and split across the following categories:

Project development costs (A)	£7,249.69
Project management costs (B)	£5,158.47
Fees for external speakers, training providers and facilitators (C)	£0.00
Travel & subsistence costs for external speakers, training providers and facilitators (D)	£820.08
Event catering and venue costs (E)	£744.00
Essential course/seminar materials (F)	£0.00
Publicity (G)	£4,732.29
Other external costs necessary to delivery (H)	£11,881.95
In-kind (I)	£0.00
Total	£30,586.47

4.3 Noting any underspend and explain why:

The full amount of the eligible £29,983 was spent during the lifetime of the project, and this was the amount claimed. A need to shift towards "virtual" farm events from March 2020 onwards due to CoVid was indicated to KTIF / Scot Gov and acknowledged by them. There was a small amount of additional spend required (not claimed for) primarily linked to time needed to support administrative requirements of the project which took more time than anticipated when the estimated budget was made due to an unfamiliarity with the KTIF reporting and administrative processes.

5. PROJECT AIMS/OBJECTIVES

5.1 Linking what was set out in the application

The project objectives were as follows:

(a) To develop and demonstrate suitable approaches to the production of organic canola in Scotland - achieved
(b) To benchmark the different approaches against key agronomic criteria - achieved
(c) To increase farmer confidence in growing the crop - achieved
(d) To provide a set of grower guidelines for Scottish farmers that can be adapted for their own farms - achieved
(e) To use the Operational Group as a form for discussion between farmers and other stakeholders throughout the duration of the project - achieved
(f) To disseminate the benefits of the project to the organic industry throughout Scotland, the UK and EU through articles, press coverage, social media, presentations at KT events and final report – achieved

The outcomes linked to these objectives and how they were delivered within the project are described in section 6 (Project Outcomes).

6. PROJECT OUTCOMES

6.1 How aims/objectives were achieved

(a) Development of a successfully functioning group that links together a range of stakeholders targeting the specific issue of how best to approach the production of organic canola in Scotland.
The Operational Group collaboration commenced soon after the start of the project in November 2019. There were 3 formally scheduled Operational Group meetings, with each one held typically 3 or 4 weeks before one of the 3 scheduled on-farm demonstration events taking place at the pilot study farms. Collaborative effort was maintained throughout the project's lifespan by utilising a WhatsApp group set up specifically for this purpose, as well as through email, phone call and vide link communication. The sub-management group consisted of Robin Walker (SRUC), Andrew Cheetham (Ceres Agri-services), David McClelland (Norvite), Gordon Whiteford (Lower Mill of Tynet Farm) and Murray Cooper (Mains of Thornton Farm). As members of the sub-management group within SCOCAN, they had additional involvement in the more day-to-day management of the project's activities, especially those linked to the organisation, planning and delivery of the "farm" demonstration events and other KE activities based around the broader discussions within the Operational Group.

(b) Data collection, grower feedback and analysis useful in informing KT materials (written and presented).
A selection of information linked to the demonstration sites, their soils, the agronomy used, pest, weed and diseases issues, crop performance through the season, yield and quality data was collected from the farms (pilot studies as well as the other 2 farms involved) and this was used to develop the KT materials that were presented at the 3 on-farm demonstration events, in the technical guide (here) and in the 3 videos (here, here and here), as well as through written and on-line media outlets and for a presentation at the European Society of Agronomy Congress held in September 2020.

(c) Successful on-farm events

The project ran 3 successful "on-farm" events during the course of the project as per the agreed schedule. The first of these events was a "live" event where the participants were able to physically attend the farm and look around and discuss the crops in the field, alongside facilitation of broader discussion linked to the agronomy and issues encountered to date when growing the oilseed rape (canola) crops organically, as well as approaches that might be used to alleviate these. The second two scheduled events were hit by CoVid19 and the project team was unable to run these as "live" events on the farms themselves. In agreement with KTIF / Scot Gov, these final two events were ultimately developed and delivered as "virtual" tours, using a blend of video clips from the farms as well as more formal presentation material which allowed for active group discussion about relative progress to date of the different crops and the approaches that had been used on the different farms to manage them. The one plus side of hosting the last two events using a virtual format was that a much wider geographical spread of participants was able to attend, with a number linking in from for example, England, Sweden and Ireland, as well as from within areas of Scotland that might not have done so had the events actually been physically held on farm (e.g. Fife and the Borders).

(d) Short videos (x3 minimum) made available on-line that summarize key approaches used at the pilot farms to highlight their experiences.

Three videos were developed and placed online (here, here and here), with each video focussing on one of the 3 pilot study farms, but with updates on the other 4 farms within the project. Each video was developed to highlight activities and critical analysis leading up to a specific key stage in the crop's development. The first video gave a general introduction to SCOCAN project and then focussed on crop establishment and varietal choice linked to the on-farm event in late January 2020; the second and third videos were recordings of the two "virtual farm tours" and both gave a very brief background to the project and then focussed on activities, observations and issues firstly leading up to flowering and pod formation and latterly leading up to crop harvest as well as yield and quality. The second two videos were longer than originally planned, but as they included all of the discussion taking place between the participants at the two "virtual" events, the information in them was extremely relevant to farmers showing an interest in growing the crop organically in the future as they highlighted the pros and cons experienced by each of the SCOCAN farmers first hand.

(e) A document providing guidance to farmers on how they might approach the growing of organic canola in Scotland.

As part of the KT materials developed from the SCOCAN project, a document, "*Organic Oilseed Rape in Scotland: A technical guide*", was produced which summarised the key areas the Operational Group regarded as needing consideration when embarking on growing a crop of organic oilseed rape (canola) in Scotland. This was based on the experience gained by all the farmers as well as the agronomist and researcher involved during the 2019/20 season. A copy of this is included in Annex 2. This document has now been made available online on the SRUC website here, but it had already been sent out to several farmers and other interested parties who have enquired about growing the crop organically. Investigations about linking this to the FAS website have now been made.

(f) An increase in farmer knowledge of how they might successfully grow organic canola in Scotland.

The project has increased farmer knowledge on how to successfully grow organic canola (oilseed rape) in Scotland, not just for the 5 farmers who grew the crop

organically as part of the SCOCAN project, but for all the other farmers and agronomists who attended the farm events, either physically, or virtually, either on the day of the event itself, by watching event videos, through accessing online reports or via a broad range of written media that was published during the project period itself, with some having been published after the project officially ended (31-Oct-2020).

(g) An increase in the number of farmers trying to grow organic canola in Scotland.

All the farmers directly involved in the SCOCAN project are currently growing autumn sown crops in the 2020/21 season, even those that had experienced crop failure the previous season. Many of them are growing larger areas of the crop than they did for the original pilot studies. There have also been a number of enquiries to various members of the Operational Group from Scottish farmers interested in growing the crop organically, with around 5 additional farmers (a 100% increase on 2019/2020 season) willing to try growing the crop on their farms in the current season (2020/2021).

(h) An increase in the amount of organic canola produced in Scotland.

Approximately 40t of organic canola was produced in Scotland for the 2020 harvest, compared to none prior to that. With approximately double the number of farmers currently growing the crop organically in Scotland, with many growing the crop on a larger area compared to their 2019/2020 sowings, assuming a reasonable season, this production figure could well double for the 2021 harvest, or even surpass that.

(i) An increase in the amount of organic canola oil and rapemeal produced for both animal feed and human use.

Norvite, the processor within the Operational Group, is currently crushing and processing around 40t of organic oilseed rape (canola) seed produced by the 5 farms involved in the project, for both oil and rapemeal. Prior to the SCOCAN project, there was almost no organic oilseed rape produced in the UK and none in Scotland.

(j) An improvement in farm and supply chain profitability and viability.

The 40t of organic canola (oilseed rape) produced by the SCOCAN farmers in 2019/20 was bought by Norvite for processing, at a price of £900/t (ex farm). This equates to around £36,000. Conventional OSR price in Scotland on 1st Oct 2020 was around £350 / tonne (https://www.fas.scot/downloads/agribusiness-news-october-2020/), and input costs for growing the crop would be much greater than those of the organic crops in SCOCAN. Once processed and marketed by Norvite, with most of the oil destined for human use in high end markets, this figure is likely to be substantially higher. The rapemeal produced as a by-product to the oil will also provide an excellent local supply of organically produced protein rich feed product that will reduce the requirement to buy in organic soya or other protein to feed livestock, especially ruminants. During discussions at one of the farm events, one of the very few organic growers based in England that had tried growing organic canola indicated that the soil quality was improved after growing the crop and had a beneficial impact on yields of the following crop, usually a cereal in his case. One of the SCOCAN farmers who had grown a spring oilseed rape crop in 2019 also commented that the spring barley he grew following that crop (in 2020) had performed very well. Although anecdotal in this instance, it appears that the break crop effect of growing an organic oilseed rape (canola) crop can provide added value to the overall farming system over the longer term.

(k) Improvement to farm and industry carbon footprint - increasing output for the same level of input reduces the CO_2 equivalent used per unit production of product (e.g. litre of oil)

Although energy and CO_2 emissions were not directly measured in the project, the inputs to the organic crops were significantly lower than many conventional oilseed rape (canola) crops, and in the 2020 harvest season, the yields achieved by the organic growers were actually not far short of many conventional oilseed rape crops grown in the region for a number of reasons. Anecdotally this was linked to reduced flea beetle impact on the organically grown oilseed rape crops that used an organically approved input and also improved desiccation and harvest efficiency (when using a swather rather than desiccating with glyphosate, the preferred method utilised by many of the region's conventional farms, but which proved to be ineffective on a number of crops in 2020 which remained green and delayed harvest beyond optimum timing).

6.2 Milestones

Activity	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20
Operational Group Meetings												
Management Group Activity												
Crop monitoring (@ all 3 farms)												
On Farm KT Event (each @ different farm)												
Video preparation and delivery												
Grower Guidelines produced												
Final Report produced												

7. LESSONS LEARNED

7.1 Issues/Challenges

Covid19 forced the last two scheduled farm events, after consultation with KTIF / Scot Gov, to be adapted to an online "virtual tour" format, which impacted on the way the videos were developed and presented. It also restricted a large part of the Operational Group activities to on-line or conference call type discussions, rather than face-to-face discussions held at one of the farms which would have allowed the group to see the crop in the field and aid discussion. The benchmark data was originally planned to be undertaken by SRUC technical staff, but travel restrictions linked to Covid19 and SRUC risk assessments and protocols meant they were unable to do this. Instead, this part of the project was covered by Ceres AgriServices who was not under the same level of restricted movement, although his daily rates were higher which had an impact on the budget. Accessing the EIP-AGRI website to update activities was not at all easy. A greater amount of SRUC staff time was required to administer the project than anticipated linked to an unfamiliarity in relation to the specific KTIF admin and reporting requirements, several admin staff changes during the project period and the need to move delivery of the farm events from physical to virtual formats linked to COVID all influenced this. The Operational Group generally got on well, but there were occasional challenges in maintaining focus and steering the project forward given a number of strong personalities.

7.2 Impacts

Simple performance benchmarks for each of the approaches used to grow organic canola on the pilot study farms.

- Use of larger seeded hybrid varieties performed better than smaller seeded hybrid varieties, and both of these performed better than non-hybrids, primarily in terms of initial crop vigour and weed suppressing ability.
- Higher disease (light leaf spot and turnip yellow virus) and pod shatter resistance rated varieties also tended to perform better than varieties known to be more susceptible to these issues.
- Conventional inversion tillage and drilling (with rolling) performed better than anticipated on the farms it was used on except on one which encountered severe wet weather immediately after drilling.
- The robot seeder / weeder (System Cameleon) used on 3 farms also performed well in most cases. The System Cameleon was the only establishment and weed control method used on both spring and autumn sown crops, with spring crops also performing better than anticipated.
- Most crops received a significant amount of farm yard manure (FYM), and several were also grown after a long-term grass-clover ley which would have high N fertility from the N fixation. One crop was grown in combination with white clover (for N fixation), and initially performed reasonably well.
- Soil and tissue analysis at key points in the growing season were invaluable in assessing possible nutrient deficiencies or imbalances, and were used to support derogation requests for approved inputs in some cases, including magnesium sulphate (EpsoTop) and seaweed extract foliar spray with micronutrients, including zinc and copper.
- Direct combining had been considered by one farmer, but swathing followed by combining approximately 10-14 days later was used effectively across all sites.
- Yields from the 5 farms averaged around 2.5 t/ha @ 9% moisture content, with the best performing crops (the larger seeded hybrid varieties with good disease resistance ratings) yielding over 3 t/ha and the worst under 1 t/ha, e.g. the undersown crop suffered due to the clover taking over after the canopy was opened up during the swathing operation and caused difficulties with combining and resulted in a high amount of seed shedding.
- The oilseed rape crops grown after grass-clover leys, or with high amounts of FYM generally performed well.
- Oil content was between 41 and 43%, and erucic acid levels were all well below the 2% level required for human use (there was actually very little difference between all of the harvested crops with respect to these quality criteria), which meant the seed could be sold at a 25% premium over that destined solely for livestock nutritional purposes.
- Volunteer oilseed rape control options ranged from repeated tine harrowing (3 times in dry conditions over a period of several weeks) before the volunteer oilseed rape seedlings had established a tap root (cotyledon to first leaf stage) to grazing off with sheep after any shed seed had chitted and started to grow. The tine harrowing seemed to be effective as it had been undertaken in a field used to grow a spring crop in 2019, but it is too early to say if the grazing option will be effective, so some caution is required here.

Evaluation on the delivery of each group meeting.
Feedback from the 23 people attending the first on-farm meeting in January 2020 was provided on a written evaluation form. These were all very positive, in terms of the venue, the materials and information delivered, the demonstration site in the field and the catering. Nothing received a lower mark than a 3 out of 5 (1 being very poor and 5 being excellent), and the average for each category was 4 or above. The 2nd and 3rd events were "virtual" farm tours, with the first of these held on 24th June 2020 and attracting 42 attendees, and the second of these held on 23rd September 2020 and attracting 30 attendees. The feedback from both of these events were registered on the event recordings themselves and in the "chat" logs linked to them. In both cases, comments along the lines of the following were common:

"Thanks a lot. So many interesting info. Look forward to seeing the final results"

"Thanks, agree very interesting"

"I've found this session to be really interesting, thank you, and would like a copy of the recording and/or the slides later if that would be possible. Thanks again"

"Well organised, thanks Robin"

Evaluation of the number of enquiries made to Norvite from farmers about the prospects of growing organic canola.
Norvite have received enquiries from around 15 farmers with an interest in growing organic oilseed rape in Scotland during the course of the project, as well during the month or so since it finished, with 3 enquiries coming in the first week of December as the final draft of this report is being prepared. The number of farms actually growing organic oilseed rape (canola) in Scotland in the 2020/21 season has now approximately doubled from the previous year as a result of the SCOCAN project, and there is a definite interest from other farmers wishing to grow the crop in future.

Evaluate the number of references to the project made in the media.
Over the lifetime of the project, and up to the time of submission of the final report, SCOCAN has been referred to in 9 newspaper or magazine articles, at least 11 internet articles with many more associated Facebook and tweet mentions, one TV programme, one podcast and a presentation at the European Society of Agronomy Congress (see Annex 1 for details of potential reach).

Evaluate the number of hits on the on-line videos.
The original videos were developed and placed on SRUC's online teaching portal using ClickView. Unfortunately, this format, although accessible by the public through advertised links, does not readily provide viewer metrics, and on requesting access to these from ClickView staff, they only had data going back one month from the date the request was made. A reasonable proportion of SRUC's Organic Farming postgraduate students (around 50 of them), some of whom attended the virtual farm visits, will have accessed the videos while logged on through the teaching portal, which apparently does not trigger the metrics which is limited to external viewings. This means that the first two videos are likely to have a much lower viewing numbers than the data available suggests. Once this was realised, the videos were mostly relocated to Vimeo where viewing metrics are more readily available from anybody logging on to view.

January Event / Project Introduction video (here)
June Event – leading up to Flowering video (here)
September Event – leading up to harvest, yield and quality video (here)

8. COMMUNICATION & ENGAGEMENT

8.1 Detail throughout the project's lifetime

A range of activities were undertaken in relation to communication and engagement both within the Operational Group, to the wider agricultural community (both organic and conventional) as well as to the press, via press releases from SRUC and other interested parties, e.g. RISS. As well as interviewing various members of the Operational Group. These are detailed in Annex 1, with highlights provided below:

Operational Group: Regarding more formal routes of communication and engagement, the Operational Group kept in regular contact throughout the duration of the project using a WhatsApp group, emails and phone calls, and 3 formal meetings were held as per the project schedule. The smaller management sub-group held additional discussions, particularly leading up to the on-farm meetings in order to prepare for these. Operational Group Meetings were held on 11th December 2019, 28th May 2020 and 19th August – all approximately 3-4 weeks prior to the On-Farm Events in order to discuss focus and data to be presented.

On-Farm Events: The three events took place on 23 January 2020, June 24th 2020 and 23rd September 2020. The first of these was actually held physically at the farm and attracted 23 attendees, the 2nd and 3rd events were "virtual" tours of the other two pilot study farms, as on farm events were forbidden due to Covid19, and these events attracted 42 and 30 attendees respectively from a wide geographical spread, including Sweden, Switzerland and Ireland.

Videos linked to On-Farm Events: As part of the communication to a wider audience, 3 videos were developed based on each of the three On-Farm events, and these have been made available on-line. The first video provides some detailed background to the project, followed by a focus on varieties, nutrition and establishment approaches to the crops on the pilot study farms (here). The second (here) and third videos (here) are recordings of the "virtual" farm tours and associated discussion held in June 2020 and September 2020 respectively.

Technical Guide: As part of the communication to a wider audience, a technical guide has been developed for Scottish grown organic oilseed rape crops - Annex 2 (and here). This has been distributed to anybody making enquiries to the Operational Group about potentially growing the crop, as well as is being made available on the SRUC webpage (new version to be launched in early 2021).

Podcast: A podcast (here) was made highlighting the SCOCAN project with interviews with two members of the Operational Group – one of the pilot study farmers, as well as from a representative of SOPA and the food/feed processor.

ESA Sept 1st to 4th September 2020: A platform paper was presented at the European Society of Agronomy Congress (held virtually, but originally meant to take place in Seville, Spain) entitled "Prospects for growing organic oilseed rape in Scotland: the SCottish Organic CANola (SCOCAN) project".

8.2 FAS Engagement (if applicable)

There was mention of the SCOCAN project in the NE Organic Discussion Group Newsletter July 2020, hosted on the FAS website. Enquiries have now been made and it is hoped that the technical guide, and the links to the event videos will be made

available through the FAS website. In addition, a FAS article mentioning the SCOCAN project has now been agreed with Fiona Burnett to be included in the June edition of the Scottish Farmer.

8.3 EIP-AGRI Engagement (if applicable)

Annual reporting information was delivered as required to EIP-AGRI in January 2020, and appeared on the website. This final report will presumably be embedded on the SCOCAN project section of the website in due course. Engagement with the website was actually quite difficult, with successful login often being elusive and hampering the periodic updating of information.

9. KEY FINDINGS & RECOMMENDATIONS

Choice of field: Choose a field with features that are more likely to deliver a successful crop, especially when growing organically. Do not grow oilseed rape in a field that has been used to grow other brassica crops within the last 5 years, has a known clubroot or brassica weed problem (e.g. Charlock). Ideally do not grow oilseed rape in fields surrounded by trees or hedges. This can increase the risk of both flea & pollen beetle, and there are only limited control options under organic standards. It can also encourage bird damage.

Previous cropping: Try to follow a crop that leaves lots of useful nutrients, particularly N in the soil, or use permitted amounts of FYM for example -

- If you follow a cereal crop, plough, then create a false seedbed to reduce both weeds and volunteers
- If you follow a grass / clover crop, graze hard or cut it tight (best option after 2nd cut of silage), then rotovate prior to ploughing
- If you follow a “Green Manure” make sure your green manure mix has species that root at different depths in the soil profile

Soil analysis & crop nutrients: Undertaking a full soil “health” survey of any field you intend to grow an organic oilseed rape crop in will likely prove beneficial. Ideally it will provide a good indication of any likely nutrient deficiencies, or excess, as well as other soil “health” indicators such as pH, potentially mineralisable N, microbial respiration and CEC. A broad spectrum analysis that includes trace elements as well as macro elements like N, P and K may also provide useful evidence if seeking permission from certification bodies to apply products to alleviate any problems.

Seed choice and establishment: 5 Point Seed Strategy

1. Always use a hybrid which has both autumn & spring vigour
2. Always choose seed with a good Thousand Grain Weight (TGW) aiming for a minimum of 5.5 g per 1000 seeds
3. Choose a variety with a good overall disease resistance rating. Turnip Yellow Virus Resistance and Light Leaf Spot (LLS) resistant (minimum AHDB 7) of particular importance
4. Choose a variety that has the Pod Shatter Resistance gene
5. Use early maturing varieties, especially for spring sown crops

Stick to the breeders recommended seed rates - 3ha pack (1.5million seeds) equals 3ha (500,000 seeds/ha). You will need derogation to use untreated conventionally produced hybrid. Roll before and after sowing to give a fine, firm seedbed with good seed to soil contact to encourage even emergence and help reduce attack from flea beetle. Organic flea beetle deterrents are coming onto the market which can be

incorporated with seed at sowing. Autumn crops should be drilled around mid August, with spring crops drilled as early as weather will allow from mid March onwards to help with earlier harvesting dates.

The preferred option for drilling in Sweden is to use a precision seeder with a robot weeding option, something like the System Cameleon for example. This approach was used on 3 out of the 5 SCOCAN farms in 2019/2020 and allowed very accurate inter row weeding on 2 or 3 occasions during the early part of the season before the crops grew away. The row spacing for this machine was 25cm. The other farms used a more traditional plough, secondary cultivation and drill approach, with a row spacing closer to 12cm, and relied on rapid establishment and vigour to suppress weeds.

Plant tissue samples: Take tissue samples at strategic growth stages, for example when the crop has 4 or 5 true leaves and at stem extension. This will indicate any nutrient issues and may be used as evidence to seek derogation from the certification body to use certain products in order to alleviate the issue. Only apply nutrients that will actually be beneficial and only those products that are approved under organic certification, or through derogation. Oilseed rape has a large tap root and can access key nutrients from lower down the soil profile, boron and molybdenum for example. If recommendations have been made and approval for their use has been met, apply foliar products at the time of advice as little benefit will be rewarded if applied at a later date.

Monitor the crop: You should ideally monitor the crop weekly for signs of stress that may be caused by nutrient issues up to early budding stage. You should be especially vigilant of pests and diseases throughout and contact an advisor in relation to issues that are of particular concern as there may be organically approved control options. Pigeons, slugs and flea beetle are common issues around establishment, with scaring devices and organically approved slug pellets available to combat the first two of these post drilling. Some new organic products are starting to appear which might limit flea beetle damage, but these are usually applied with the seed when it is drilled. Other organic products are starting to become available for control of pollen beetle later in the season. Resistant varieties will hopefully reduce disease problems (e.g. Light Leaf Spot), but Sclerotinia is one disease where severity can fluctuate between seasons, with limited options for control.

Swathing: Swathing, rather than direct combining, would be the preferred option to help desiccate the crop and even up seed maturity in most cases. Always swath using the widest available swather as it will help concentrate any shed seed, and therefore volunteers within the swather bout width. Seeds in the upper third of the pods should be starting to turn from green to brown, with the lower third of the pods containing seeds that are already dark brown to almost black.

Harvesting & Volunteer Control: Combining is likely to take place around 10 to 14 days after swathing was undertaken and the seeds have desiccated and developed a dark brown / black colouration. Ideally use a combine harvester that has a Draper Header and shut off chaff spreaders when in use. Bale and remove the straw from field at the earliest opportunity, as this will help reduce volunteer problems in the future. Do not incorporate the straw, as this is likely to increase the number of seeds in the seedbank which may lead to increased volunteer oilseed rape issues in future years.

Once combined, dry and condition the seed within 48hrs to around 9% moisture in order to reduce the risk of the seed heating up through natural processes leading to a deterioration of oil quality and possibly spoilage. Yields from the 5 farms averaged around 2.5 t/ha @ 9% MC, with the best performing crops yielding slightly over 3 t/ha

and the worst under 1 t/ha. Oil content was between 41 and 43%, and erucic acid levels were all well below the 2% level required for human use, which meant the seed could be sold at a 25% premium over that destined solely for livestock nutritional purposes.

Allow any seed that has been shed during the harvesting operations to germinate. You need to control these volunteers early if using mechanical weeding, ideally at cotyledon stage before the taproot forms. Several passes with a tine harrow over a number of weeks can prove effective. Other options include allowing the volunteers and other weeds to grow and graze off over the winter with sheep, however, this wasn't the recommended option provided by the Swedish farmers.

Note of caution: These recommendations have been produced based on the experience gained by the participants of the SCOCAN project over just one season, utilising information gathered from a limited number of treatments on a small number of demonstration farms using non-replicated pilot studies.

10. CONCLUSION

The SCOCAN project delivered its brief in proving, through use of the pilot study demonstration farms and the other farms involved in the Operational Group that growing oilseed rape (canola) in Scotland was not only possible, but could produce good yields that were comparable to many conventional oilseed rape crops in the same area, but using lower inputs. The price premium, not only for organic oilseed rape seed, but also if the quality spec for human use was reached, which all of the 2020 harvested crops did, is of additional benefit.

In terms of practicalities, the use of larger seeded hybrid varieties performed better than smaller seeded hybrid varieties, and both of these performed better than non-hybrids, primarily in terms of initial crop vigour and weed suppressing ability. Higher disease (light leaf spot and turnip yellow virus) and pod shatter resistance rated varieties also tended to perform better than varieties known to be more susceptible to these issues. Conventional inversion tillage and drilling (with rolling) performed better than expected. The robot seeder / weeder used on 3 farms also performed well in most cases, and the robotic weeding option certainly seemed to be effective in the wider row spacing. This was the only establishment and weed control method used on both spring and autumn sown crops, with spring crops also performing better than anticipated. Soil and tissue analysis at key points in the growing season were invaluable in assessing possible nutrient deficiencies or imbalances, and were used to support derogation requests for approved inputs in some cases, including magnesium sulphate (EpsoTop) and seaweed extract foliar spray with micronutrients, including zinc and copper). Crops that had been grown after a long grass-clover ley and that had received a significant amount of FYM generally performed well. Swathing followed by combining was generally an effective harvesting combination for the organically grown oilseed rape crops.

11. ANNEXES

Annex 1: Press and media activities

Headline	Date	Summary	Media Type	Publication	Author	Reach
Scientists explore options on organic oilseed	Jan-20		Internet	Food & Farming Futures (Web)	Unattributed	716
Organic oilseed rape could open new markets for Scottish growers	Jan-20		Magazines Trade & Overseas	Farm North East	Ewan Pate	5000
Scotland's first organic oilseed rape showing great potential	Jan-20		Magazines Trade & Overseas	Farmers Guardian	Unattributed	40000
Scots scientists explore options on organic oilseed	07-Jan-20	Web link here	Internet	SRUC Website / Facebook / Twitter	Robin Walker	~13000
Funding for Organic Oilseed Rape RISS group	09-Jan-20	Web link here	Internet	RISS/Soil Association	Unattributed	~ 9000
Chance to see organic canola trial in action in north-east	11-Jan-20		UK Key Regionals	Press and Journal	GEMMA MACKENZIE	20146
Could organic oilseed work for Scotland?	11-Jan-20		UK Key Regionals	Scottish Farmer	Gordon Davidson	
RISS Farmer Focus: Murray Cooper	30-Jan-20		Internet	RISS/Soil Association	Unattributed	~ 9000
Initial success for Scotland"s first organic oilseed rape crop	05-Feb-20		Internet	FG Insight (Web)	Unattributed	9518
Rural Innovation Support Service	Spring 2020		Magazines Trade & Overseas	Organic Farming	David Michie	
How farmers are growing Scotland's first organic OSR crop	12-Mar-20	Web link here	Magazines Trade & Overseas	Farmers Weekly	Richard Allison	~115000
Landward	3 dates across May 2020		TV	Landward	Chris Gospel	~40000
Organic oilseed rape on virtual agenda	19-Jun-20		Internet	Press and Journal (Aberdeen) (Web)	Unattributed	46031
Virtual meeting offers canola project update	19-Jun-20		UK Key Regionals	The Courier (Main Edition)	Unattributed	10554
Organic oilseed rape on virtual agenda	19-Jun-20		UK Key Regionals	Press and Journal	Unattributed	20146
Virtual meeting offers online tours of innovative canola plots	23-Jun-20		Internet	AgriLand (Web)	Unattributed	104
Virtual meeting offers online tours of innovative Canola plots	23-Jun-20	Web link here	Internet	SRUC Website / Facebook / Twitter	Robin Walker	~13000
Organically grown OSR looking a real winner	19-Aug-20		Internet	LG Seeds (Web)	Unattributed	?
PROSPECTS FOR GROWING ORGANIC OILSEED RAPE IN SCOTLAND: THE SCOTTISH ORGANIC CANOLA (SCOCAN) PROJECT	01-04 Sept 2020		European Society of Agronomy Congress	ESA Congress Seville	Robin Walker / Andrew Cheetham	300
Organic oilseed rape production in Aberdeenshire	02-Nov-20	Web link here	Podcast Internet	OnFARM rural podcast	Unattributed	?
SCottish Organic CANola	25-Nov-20		Internet	Provenance Post Brexit – The Science of Provenance	Robin Walker	100
How Scottish organic OSR growers delivered yields up to 3.1t/ha	25-Nov-20	Web link here		Farmer Weekly	Emma Gillbard	~115000
ORGANIC OILSEED RAPE PRODUCTION IN SCOTLAND	Winter 2020 edition		Magazines Trade & Overseas	Irish Organic Association - Organic Matters	Robin Walker	1,800

Annex 2: Technical Guide (technical notes page)

Organic Oilseed Rape in Scotland: A technical guide

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The European Agricultural Fund for Rural Development: Europe investing in rural areas

Scottish Rural Development Programme

The Queen's Anniversary Prizes

Introduction

Organic oilseed rape (canola) is very rarely grown in the UK, and not at all in Scotland. This is due to a number of agronomic factors linked to provision of adequate fertility, disease, pest and weed issues, with the latter also being of concern if seed shed by the oilseed rape was to become a pernicious volunteer weed over many seasons. Under organic standards, there are limited options to control these factors compared to conventional approaches that can use agrochemicals.

However, some European countries, such as Sweden, have been successfully growing organic oilseed rape for around 20 years, currently around 10,000 ha, or 10% of the total oilseed rape crop in that country. As Scotland is on a similar latitude to Sweden, a few enterprising Scottish farmers and other interested parties from a RISS group undertook a study tour in early 2019 to develop knowledge and understanding of how the crop was grown in Sweden and to evaluate its potential to be grown successfully in Scotland.

The information provided in this technical guide was developed through a Knowledge Transfer Innovation Fund - KTIF project (SCottish Organic CANola - SCOCAN) where 5 Scottish organic farms grew oilseed rape with guidance from an agronomist and researcher alongside other interested parties along the chain.

An organic oilseed rape crop growing in NE Scotland

Field Location & Pre-cropping Considerations

Choose a field with features that are more likely to deliver a successful crop, especially when growing organically. Do not grow oilseed rape in a field that has been used to grow other brassica crops within the last 5 years, has a known clubroot or brassica weed problem (e.g. Charlock). Ideally do not grow oilseed rape in fields surrounded by trees or hedges. This can increase the risk of both flea & pollen beetle, and there are only limited control options under organic standards. It can also encourage bird damage.

Previous cropping:

- try to follow a crop that leaves lots of useful nutrients, particularly N in the soil, or use permitted amounts of FYM for example
- If you follow a cereal crop, plough, then create a false seedbed to reduce both weeds and volunteers
- If you follow a grass / clover crop, graze hard or cut it tight (best option after 2nd cut of silage), then rotovate prior to ploughing
- If you follow a "Green Manure" make sure your green manure mix has species that root at different depths in the soil profile

Soil Analysis & Crop Nutrients

Undertaking a full soil "health" survey of any field you intend to grow an organic oilseed rape crop in will likely prove beneficial. Ideally it will provide a good indication of any likely nutrient deficiencies, or excess, as well as other soil "health" indicators such as pH, potentially mineralisable N, microbial respiration and CEC. A broad spectrum analysis that includes trace elements as well as macro elements like N, P and K may also provide useful evidence if seeking permission from certification bodies to apply products to alleviate any problems.

Seed Choice & Establishment

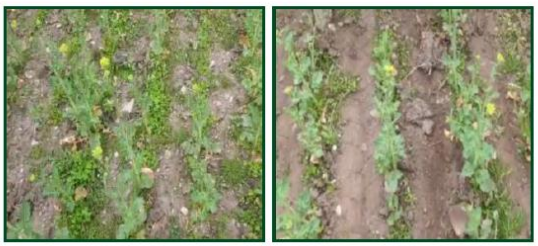
Follow the **5 Point Seed Strategy** (MUST tick all 5 boxes)

1. Always use a hybrid which has both autumn & spring vigour
2. Always choose seed with a good Thousand Grain Weight (TGW) aiming for a minimum of 5.5 g per 1000 seeds
3. Choose a variety with a good overall disease resistance rating. Turnip Yellow Virus Resistance and Light Leaf Spot (LLS) resistant (minimum AHDB 7) of particular importance
4. Choose a variety that has the Pod Shatter Resistance gene
5. Use early maturing varieties, especially for spring sown crops

Stick to the breeders recommended seed rates - 3ha pack (1.5million seeds) equals 3ha (500,000 seeds/ha). You will need derogation to use untreated conventionally produced hybrids as no organic seed is currently available. Roll before and after sowing to give a fine, firm seedbed with good seed to soil contact to encourage even emergence and help reduce attack from flea beetle. Organic flea beetle deterrents are coming onto the market which can be incorporated with seed at sowing. Autumn crops should be drilled around mid August, with spring crops drilled as early as weather will allow from mid March onwards to help with earlier harvesting dates.

The System Cameleon drill / robotic weeder working in an organic oilseed rape crop growing in NE Scotland

The preferred option for drilling in Sweden is to use a precision seeder with a robot weeding option, something like the System Cameleon for example. This approach was used on 3 out of the 5 SCOCAN farms in 2019/2020 and allowed very accurate inter row weeding on 2 or 3 occasions during the early part of the season before the crops grew away. The row spacing for this machine was 25cm. The other farms used a more traditional plough, secondary cultivation and drill approach, with a row spacing closer to 12cm, and relied on rapid establishment and vigour to suppress weeds.

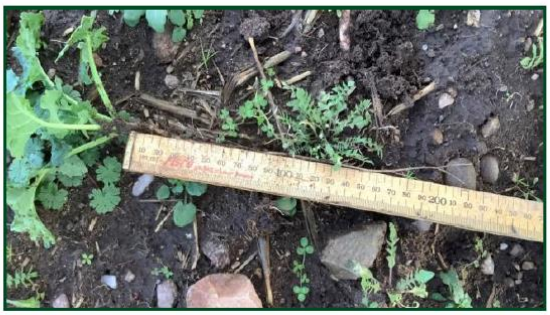


The crop before (left) and after (right) the System Cameleon had been used to robotically weed one of the Scottish organic oilseed rape crops

Plant Tissue Samples

Take tissue samples at strategic growth stages, for example when the crop has 4 or 5 true leaves and at stem extension. This will indicate any nutrient issues and may be used as evidence to seek derogation from the certification body to use certain products in order to alleviate the issue. Only apply nutrients that will actually be beneficial and only those products that are approved under organic certification, or through derogation.

Oilseed rape has a large tap root and can access key nutrients from lower down the soil profile, boron and molybdenum for example. If recommendations have been made and approval for their use has been met, only apply foliar products at the time of advice - not 3 months later, as you will see little benefit and just waste money.



The oilseed rape's large taproot can access nutrients deep down the soil profile

Monitor The Crop

You should ideally monitor the crop weekly for signs of stress that may be caused by nutrient issues up to early budding stage. You should be especially vigilant of pests and diseases throughout and contact an advisor in relation to issues that are of particular concern as there may be organically approved control options. Pigeons, slugs and flea beetle are common issues around establishment, with scaring devices and organically approved slug pellets available to combat the first two of these post drilling. Some new organic products are starting to appear which might limit flea beetle damage, but these are usually applied with the seed when it is drilled. Other organic products are starting to become available for control of pollen beetle later in the season.

Resistant varieties will hopefully reduce disease problems (e.g. Light Leaf Spot), but Sclerotinia is one disease where severity can fluctuate between seasons, with limited options for control. 2019/20 season was kind in this regard.

Swathing

Swathing, rather than direct combining, would be the preferred option to help desiccate the crop and even up seed maturity in most cases. Always swath using the widest available swather as it will help concentrate any shed seed, and therefore volunteers within the swather bout width. Seeds in the upper third of the pods should be starting to turn from green to brown, with the lower third of the pods containing seeds that are already dark brown to almost black.

Swathing an organic oilseed rape crop growing in NE Scotland

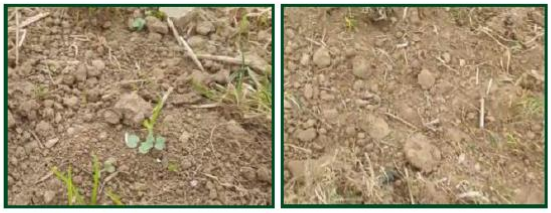
Harvesting & Volunteer Control

Combining is likely to take place around 10 to 14 days after swathing was undertaken and the seeds have desiccated and developed a dark brown / black colouration. Ideally use a combine harvester that has a Draper Header and shut off chaff spreaders when in use.

Bale and remove the straw from field at the earliest opportunity, as this will help reduce volunteer problems in the future. Do not incorporate the straw, as this is likely to increase the number of seeds in the seedbank which may lead to increased volunteer oilseed rape issues in future years. Once combined, dry and condition the seed within 48hrs to around 9% moisture in order to reduce the risk of the seed heating up through natural processes leading to a deterioration of oil quality and possibly spoilage.

Yields from the 5 farms averaged around 2.5 t/ha @ 9% MC, with the best performing crops yielding slightly over 3 t/ha and the worst under 1 t/ha. Oil content was between 41 and 43%, and erucic acid levels were all well below the 2% level required for human use, which meant the seed could be sold at a 25% premium over that destined solely for livestock nutritional purposes.

Allow any seed that has been shed during the harvesting operations to germinate. You need to control these volunteers early if using mechanical weeding, ideally at cotyledon stage before the taproot forms. Several passes with a tine harrow over a number of weeks can prove effective. Other options include allowing the volunteers and other weeds to grow and graze off over the winter with sheep, however, this wasn't the recommended option provided by the Swedish farmers.



Volunteer control before (left) and after (right) using a spring tine harrow in one of the Scottish organic oilseed rape crops

A Note Of Caution

This technical guide has been produced based on the experience gained by the participants of the SCOCAN project over just one season, utilising information gathered from a limited number of treatments on a small number of farms using non-replicated pilot studies.

Remember growing organic oilseed rape is not just about having the right variety, sowing it and then just shutting the gate until harvest time. The 2019/20 season was a very low disease season, especially for Sclerotinia, and at the time of writing, the 2020/21 season has experienced relatively warm and wet growing conditions, which are likely to encourage disease. There are a number of organic options available which may aid disease control, but these haven't been investigated to any extent in SCOCAN as disease was not a major factor in the 2019/2020 season in which the project took place. Your advisor may be able to suggest some options if you are having issues.

Further Information

There are 3 videos which have been produced based on the demonstration events linked to the 3 pilot study farms, each one focussing on a different key stage in the organic oilseed rape (canola) crop's maturity. These can be accessed here: https://vimeo.com/475418922

The SCOCAN funding was made available through the SRDP Knowledge Transfer and Innovation Fund, which is jointly funded by the Scottish Government and the European Union

KTIF Final Report Guidance

Guidance:

- Introductory section explaining the basis for the project utilising rural development regulation you appropriate EU Grant Measure (ie. 16.1), making mention of the operational group (if appropriate), the roles and responsibilities of members and what the group set out to achieve;
- Report back on project aims and objectives and if they've been achieved – much of this can be pulled from the KTIF application;
- Detailed information on actual spend and how much was underspent (if any and a reason). How much funding was provided, from where (ie. 75% or 100% co-funded by SG/EU) and details of the project duration and milestones;
- Section on 'Lessons Learned'. Things which were highlighted as issues, resolved or to do better if done again. We understand some project won't work out as well as hope but be honest about this. By identifying limitations we can target the problem;
- Pull information in from the other reports your project has produced (ie. Progress Reports and Evaluation Reports) or as appropriate annex these;
- Remember your audience. Avoid too technical language and don't assume the reader has in-depth knowledge.
- A table detailing communications which have gone out (where, when and the size of the audience) and commentary would be beneficial;
- Detailed information on actual spend and how much was underspent (if any and a reason). How much funding was provided, from where (ie. 75% or 100% co-funded by SG/EU).