



Weed management: 60 years of experience

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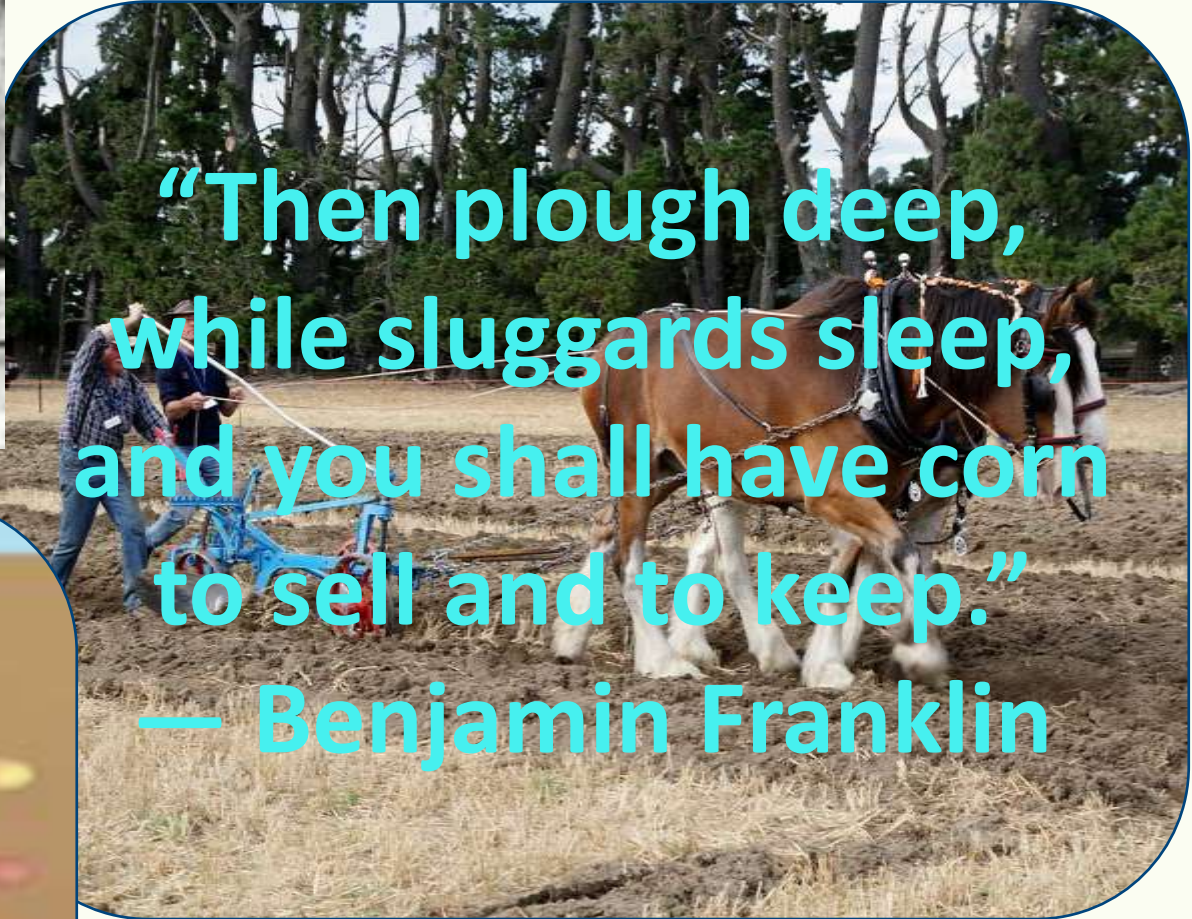
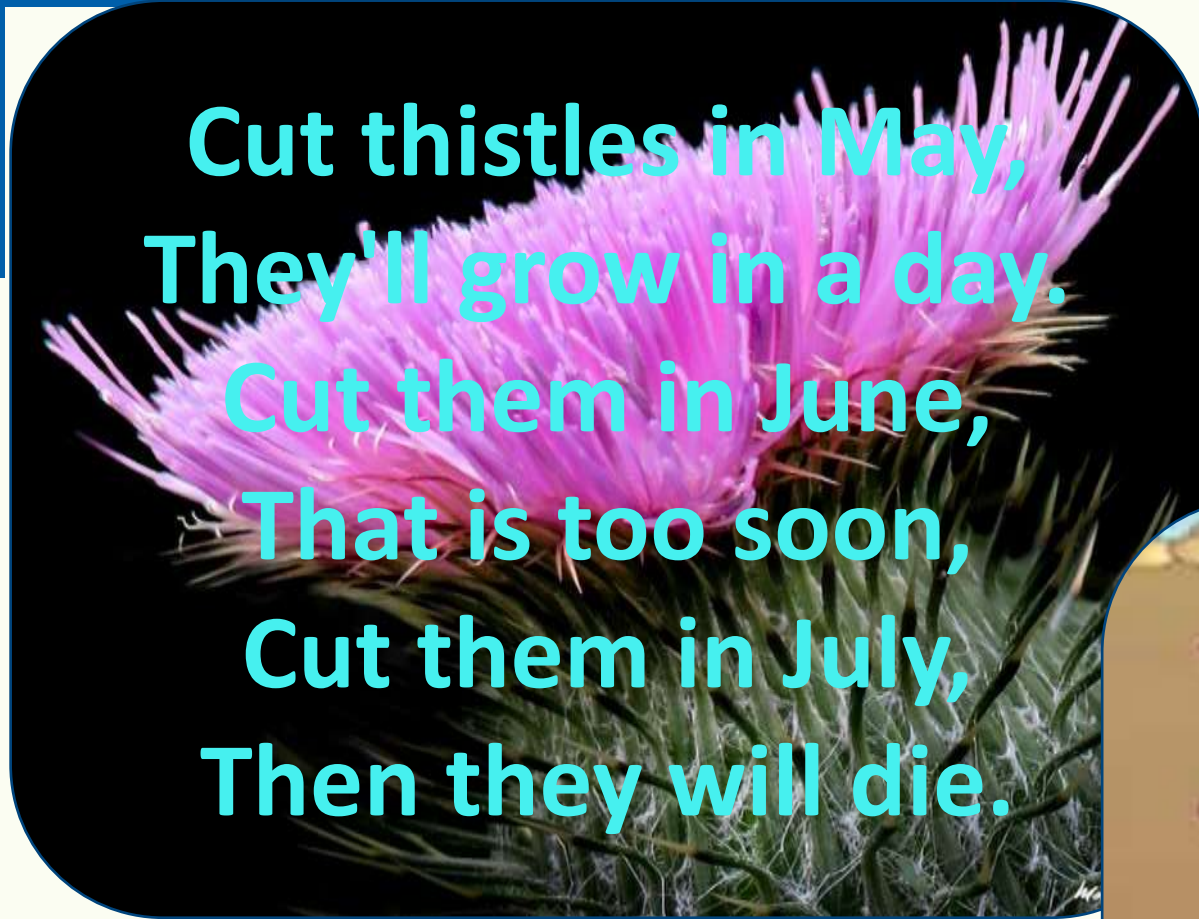
BCPC Annual Review of Weed Control, 2 November 2023



Weed management: [over] 60 years of experience



- Weeds not new and divide opinion
- Leading others: weed reviews and collaboration
- Sound evidence-base in research and publications
- Comings & goings!
 - Cultural control (rotation, cultivation, preventing seed dispersal)
 - Herbicides & application
 - Changing weed problems
- Challenges for herbicides
- Your reflections (survey)
- Future priorities



Weeds divide opinion



ASK THE MEMBERS

Last month we asked you:

What is a weed?

You said:



"In my garden it's anything that's growing where I don't want it to grow – or getting too big for its boots"

Mark Griffin, Bedfordshire

"A wild plant that hasn't been cultivated and, if not watched carefully, may take over"

Sylvia Fairhurst, Greater Manchester

"Weeds are uninvited guests in our gardens, robbing the soil of nutrients and depriving our chosen plants of essential elements"

Graeme Stockdale, Derbyshire

"It's just a plant that is growing in the wrong place. So a seed potato in my veg plot is fine, but if it's in my flower bed I'll pull it up"

Mike Canaway, Greater Manchester

To me, weeds are a chance to let something new grow"

Irena Peel, Tyne and Wear

"Climate change means it's time to look differently at weeds. They are good for biodiversity so we should leave them in the garden!"

Lia Wallenburg, The Netherlands

"I believe that no plant is a weed. It's really just a wildflower growing in an unintended place"

Kate Dickens, Kilmarnock

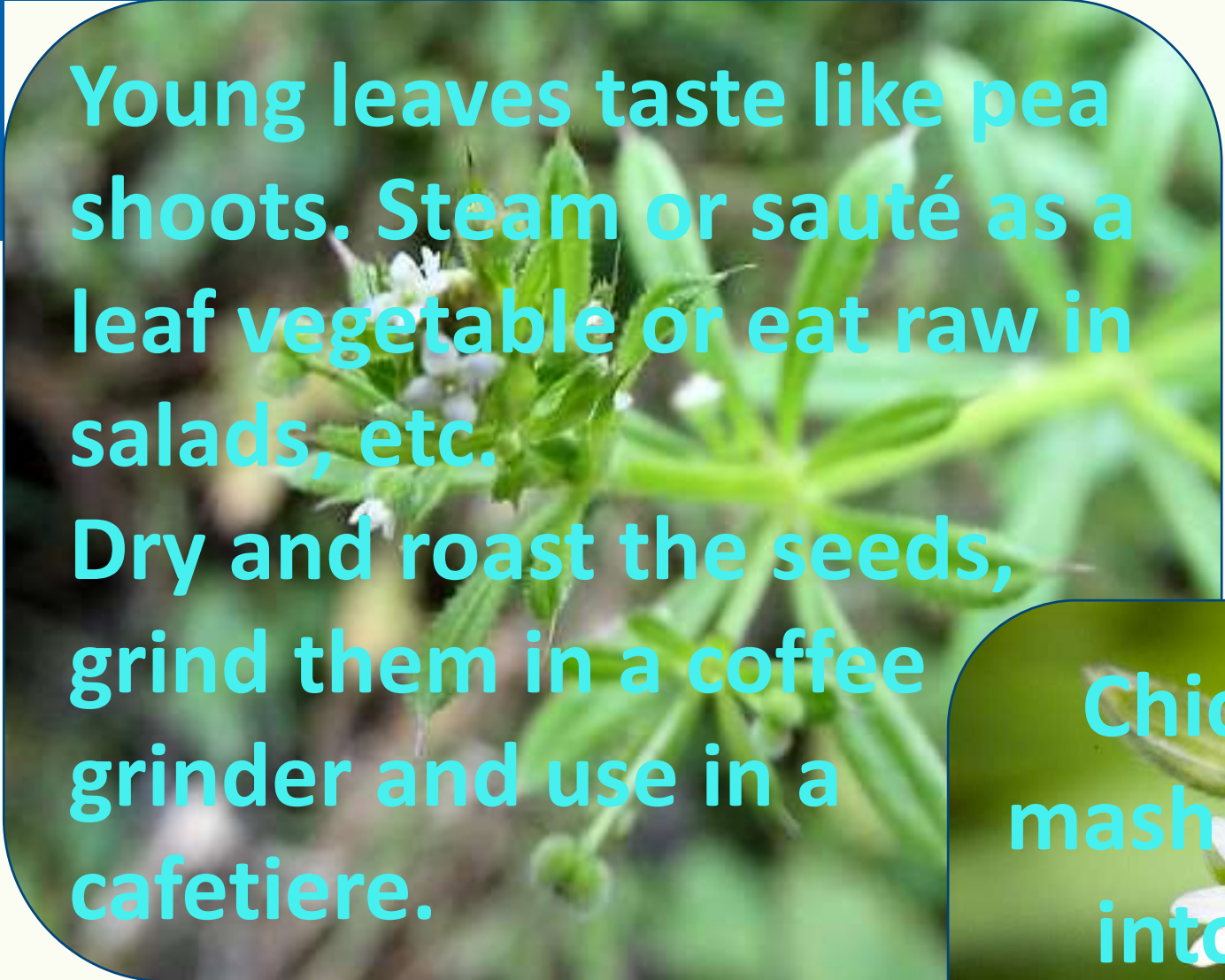
"Weeds are pretty, supply nitrates back into the soil, fabulous for wildlife and important for biodiversity"

Jennifer Wilkins, Sussex

"I used to pull foxgloves out until I went to the RHS Chelsea Flower Show and realised that they can be very pretty. Now I let them grow where they wish"

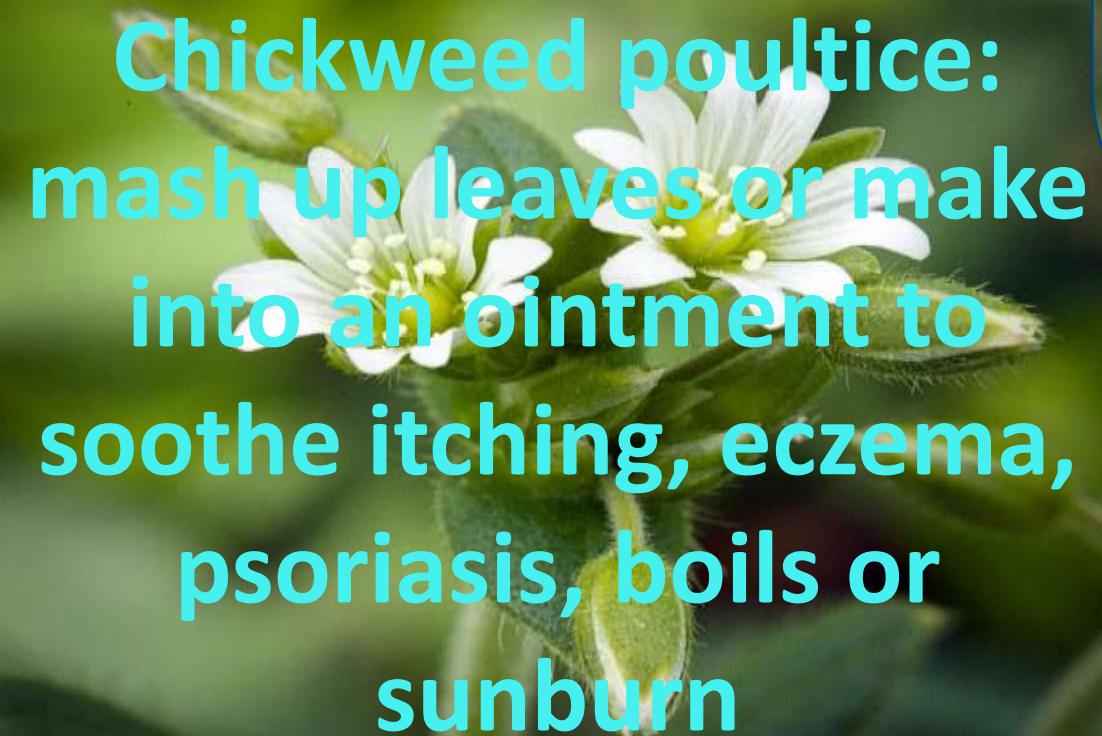
Milli Wilson, Northumberland

Weeds have uses in medicine and cooking

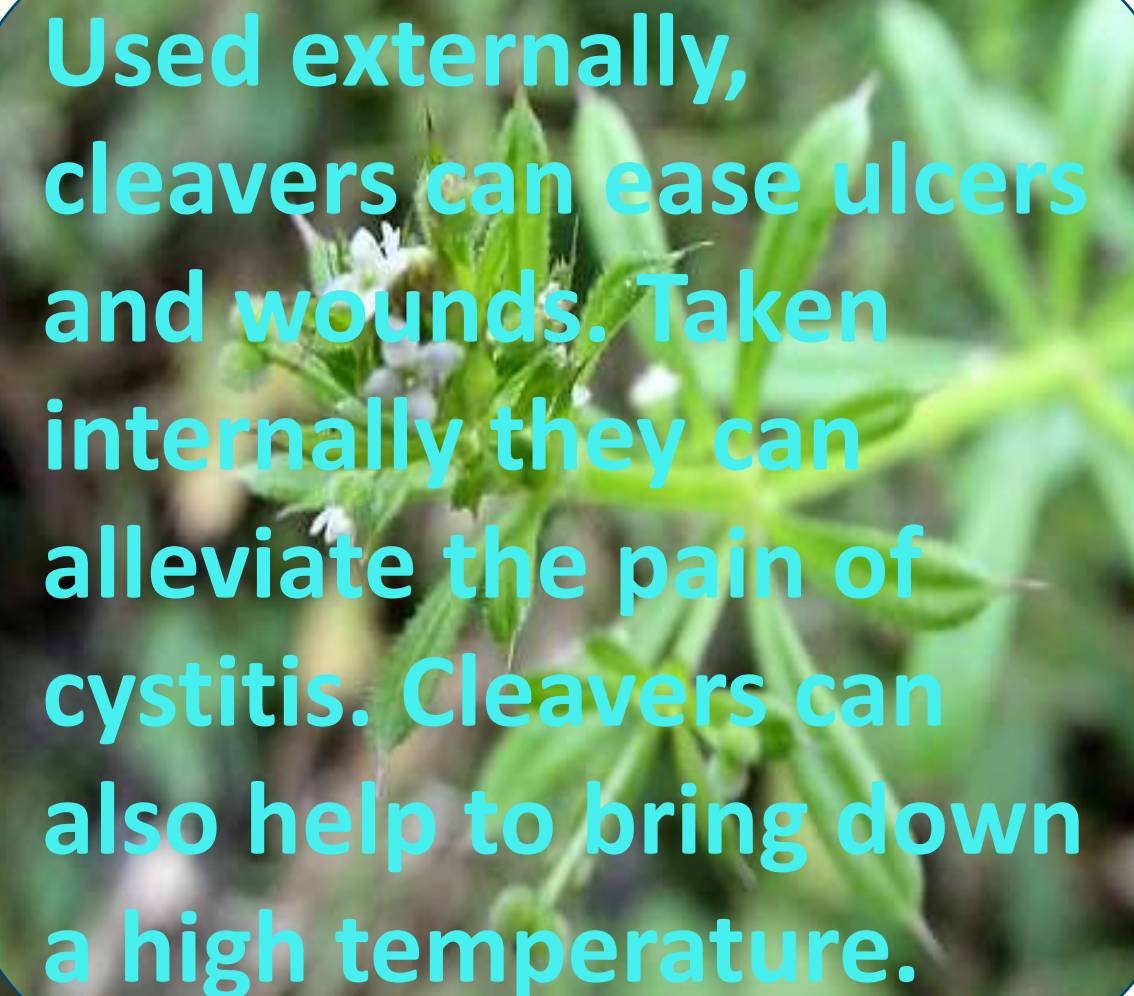
A close-up photograph of a cleavers plant, showing its green, lanceolate leaves and a cluster of small, white, star-shaped flowers.

Young leaves taste like pea shoots. Steam or sauté as a leaf vegetable or eat raw in salads, etc.

Dry and roast the seeds, grind them in a coffee grinder and use in a cafetiere.

A close-up photograph of a chickweed plant, showing its green leaves and a cluster of small, white, star-shaped flowers.

Chickweed poultice: mash up leaves or make into an ointment to soothe itching, eczema, psoriasis, boils or sunburn

A close-up photograph of a cleavers plant, showing its green, lanceolate leaves and a cluster of small, white, star-shaped flowers.

Used externally, cleavers can ease ulcers and wounds. Taken internally they can alleviate the pain of cystitis. Cleavers can also help to bring down a high temperature.

- 1950 Agricultural Research Council research unit in Oxford
 - ARC Unit of Experimental Agronomy (Director Dr E K Woodford).
 - One of objectives was to develop chemical weed control (H_2SO_4 , Cu salts, mineral oils) and the foundations of DNOC, DNBP then MCPA, 2,4-D.
 - Several British companies already marketing a few selective weed killers and had massive investment in synthesis and screening.
 - Supported by NAAS [ADAS] (J F Ormerod) identified need to promote communication and collaboration between organisations involved with development and use.
- 5 November 1952 MAFF agreed to sponsor an *ad hoc* meeting to explore attitudes, review current work on weed control and identify outstanding problems and proposals for dealing with them.
 - 40 participants from ARC, ADAS, CropLife, NAAC, CABI, NIAB, RRes (LARS & GRI).
 - Chair summarises with “weedkillers must be regarded only as an aid to good husbandry and not a substitute for it!”

British Weed Control Council formed; later becomes BCPC



- 1953 2nd British Weed Control Conference (Harrogate)
 - British Weed Control Council (BWCC) constitution adopted and created
 - Objectives were:
 - To promote and encourage science and practice of weed control.
 - To organise conferences on weed control, to publish and sell or otherwise distribute the reports of the proceedings.
 - To disseminate information on weed control.
 - To collaborate with other organisations the objects of which are to encourage the science and practice of crop protection.
 - To do all other lawful things incidental or conducive to the above objectives.
 - Regular Weed Control conferences (Brighton Conferences)
 - Published Weed Control Handbook(s), in early days was basis of efficacy in ACAS
- 1962, success of BWCC, led to formation of British Insecticide and Fungicide Council (BIFC)
- 1965 BWCC & BIFC consider desirability of amalgamation (controversial to some!)
- 28 September 1967, met separately for last time, and immediately formed British Crop Protection Council

70th anniversary of BCPC

Weed management: leading others in reviews and collaboration



- Nov 1952 meeting followed up on 16 December with first 'Weeds Group' meeting.
 - Dissemination of weed control information, especially between industry & official bodies.
 - Means of educating public opinion on weed control and spraying matters.
 - Possibility of holding national or regional weed control conferences.
 - Economic aspects of weed control.
 - Possibility of arranging co-ordinated experiments and observations
- 1953 First National Weed Control Conference (Margate) & formation of what became British Weed Control Council (BWCC)
- 1956 First biennial British Weed Control Conference (1745 delegates, 132 papers in 3 volumes)
- 1960 European Weed Research Council formed & Weed Research published (EWRS since 1975)
- 1964-1968 Annual Review of Herbicide Usage (Weed Control, 1969) BWCC (BCPC since 1969)
- 1979 International Weed Science Society formed



Research base: government-funded research institute(s)



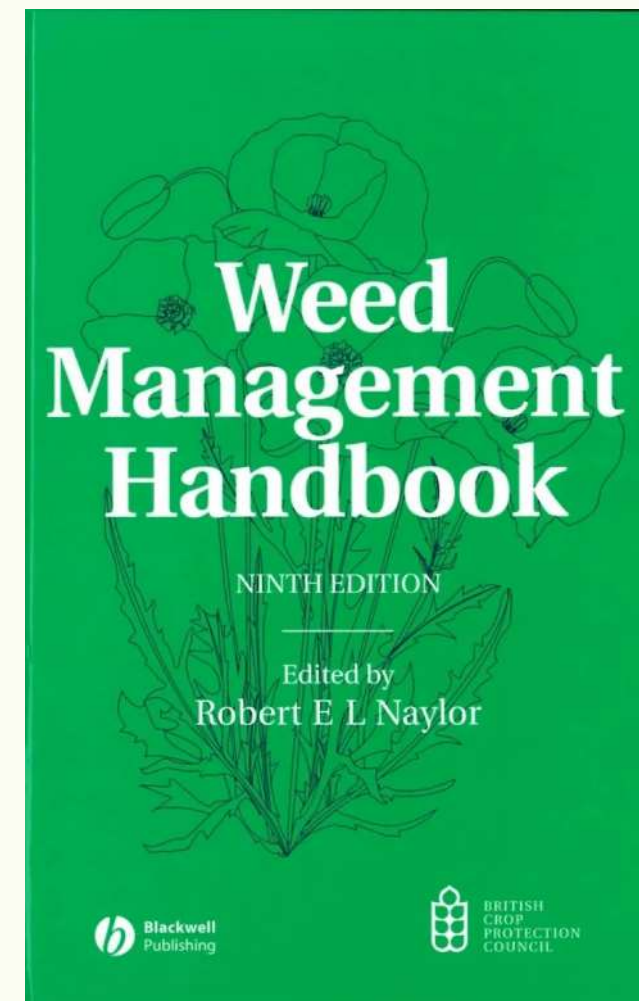
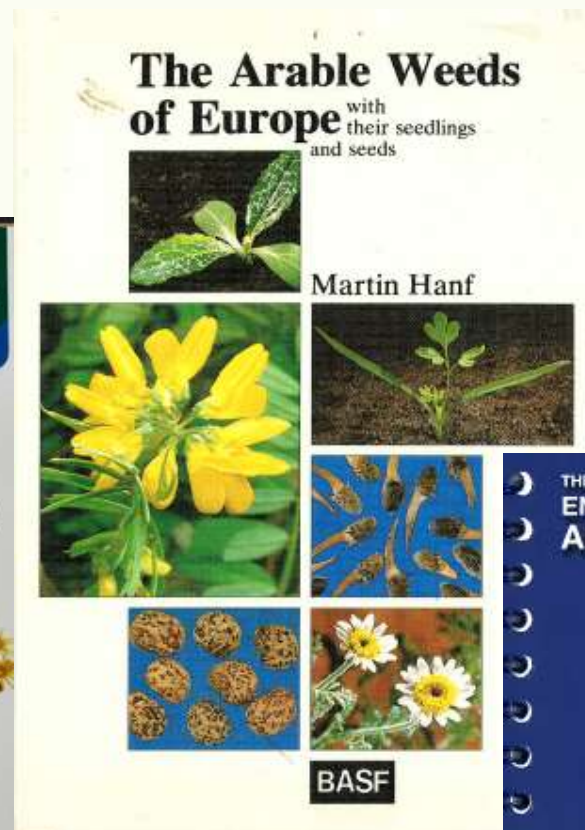
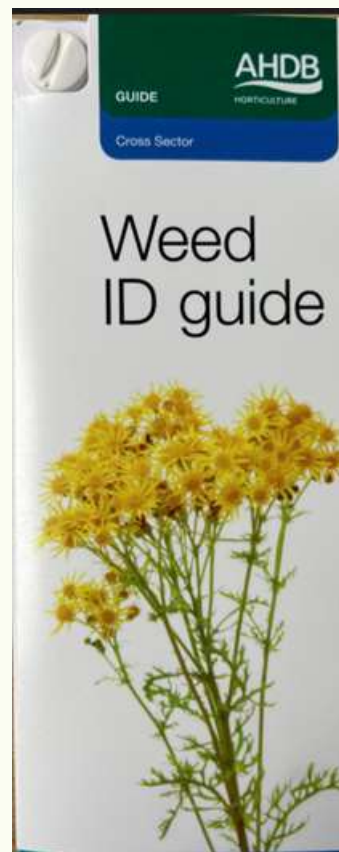
- Weed Research Organisation (from 1960)
 - 79 scientists; total 135 staff
- Long Ashton Research Station (1986)
 - c.30 staff
- Rothamsted (1990)
 - 4 staff (GC, PL, SM, AM)

Evidence-based publications



Sound foundations in science and communication of knowledge

- Weed Control Handbook (1958, 2 vols from 1968, 8th edition in 1990)
- Weed Management Handbook 2002
- Weed biology



BCPC review agendas and proceedings: constants and evolution



1973 10th Review

AGENDA

Chairman: J D Fryer, Director, Weed Research Organization

Page		Summariser
<u>PART I</u>		
a) <u>Annual Grass Weeds in Cereals</u>		
1	Biological factors that affect the control of blackgrass and wild oats in cereals	G W Cussans
3	The current position of control of blackgrass and wild oats by herbicides	R J Makepeace
b) <u>Summary of Other Subjects Suggested for Detailed Review By Member Organisations in 1973</u>		
9	Weed control in crops new to UK	J D Fryer
9	Standardisation of cereal growth stage terminology	R J Makepeace
9	Problem of applying herbicides at the optimum growth stage of winter wheat	R J Makepeace
c) <u>Soil Acting Herbicides</u>		
10	Factors that contribute to the problem of herbicide residues in soil	K Holly
13	The problem of matching herbicide dose to soil type	R J Hance
<u>PART II</u>		
<u>A Concise Review of Herbicide Usage Problems in 1973</u>		
21	A review of the weather October 1972 to September 1973	D Tyson
22	Cereal crops: broad-leaved weeds	D Tyson
25	Application factors	H J Nation
27	Peas and beans	J N King
29	Grass and forage crops	E B Scragg
32	Potatoes	F E Shotton
35	Sugar beet	W E Bray
37	Perennial horticultural crops	D V Clay
40	Herbicides and the environment	J M Way
41	Vegetables	J W Hancock
Report to the British Crop Protection Council following the 1973 review of Herbicide Usage		

VI

Herbicides & efficacy

1983 20th Review

AGENDA

Subject	Summariser	Page
Notes on Action Taken From The 1982 Review	P.J.W. Lutman	1
The Weather in The UK: September 1982 to August 1983 Spray Occasions Analysis: June 1982 to May 1983	E.A. Spackman	4
Application	E.S.E. Southcombe	11
Spray Drift and Its Control	J.H. Oron	14
Labelling of Weedkillers	G.G. Tucker	16
Novel Items or Specific Problems Not Covered Elsewhere	M.E. Upton	19
Grass Weed Control - Experience With Newer Graminicides and Their Impact on The Husbandry of Sugar Beet and Other crops	W.E. Bray	21
Factors Influencing Grass Weed Infestations	G.W. Cussans	23
Residual Herbicides	H.M. Lawson*	25
Problem Weeds and Their Control in Rape and Root Crops	R.T.G. Ford	27
Grassland Weed Problems and Their Control	Dr. A.D. Courtney	30
Matters Arising from The 1983 Usage Review	P.J.W. Lutman	33

* Subject not discussed at the Review meeting

Application & drift

1993 30th Review

Notes on the Actions Taken on the Recommendations of the 1992 Annual Review of Weed Control
P J W Lutman 1

Disposal of Containers and Spray Washings
C J C Wise 3

Disposal of Used Containers and Spray Washings: Future Solutions in Development
T H Robinson 6

A Synopsis of the Weather: August 1992 to July 1993
P J W Lutman 12

Autumn Weed Control Problems: The Effects of Autumn 1992 Weather
P Taylor 13

Industrial and Amenity Weed Control: Adapting to Change
R P Garnett 17

Industrial Weed Control: The Contractor's Viewpoint
R H Hirst 22

Weed Control Problems in Minor Crops
A J Greenfield 25

How to Read the Label Before You Buy
D W Ward 31

Matters Arising from the 1993 Annual Review of Weed Control
D Tyson 35

Disposal & washing

2003 40th Review

Notes on the action taken on the matters arising from the 2001 Annual Review of Weed Control
P J W Lutman 5

A synopsis of the weather September 02 to August 03
P J W Lutman 7

Weed Control in Forestry and Amenity Trees
Colin Palmer
UK Forestry Pesticide Advisor 9

Couch and Sterile Brome. Occurrence and control with new compounds
Lynn Collings
ADAS Boxworth 15

Life after Avadex and terbutryne. A review of blackgrass control
Peter Taylor
AICC 23

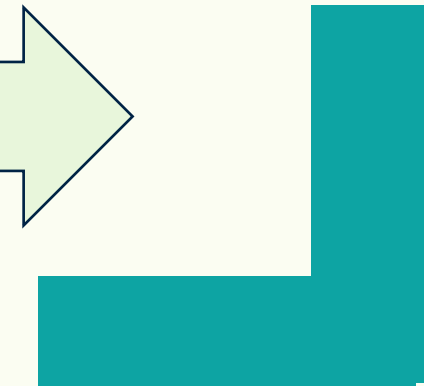
Liability of using herbicides at reduced label rates
Mike Read
Bayer CropScience Ltd 29

Problems in developing herbicides in the current UK market
David Payne
Syngenta Crop Protection (UK) Ltd 33

Matters arising from 2003 Annual Review of Weed Control
P J W Lutman 37

Loss of herbicides

Problem weeds



Pre 1940s herbicides

Copper sulphate (selective in cereals)

- 1896: France
- 1898: GB

Ferrous sulphate, sulphuric acid, sodium chlorate

- 1901-19: Europe & USA
- 1930s substantial in GB

Dinitro-phenols & cresols

- 1932-33: France



Decades of weed management experience: changing decades



Pre 1940s herbicides

1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s	2020s
2, 4-D	Atrazine	Simazine	IPU	ALS	Flufenacet		Aminopyralid	Cinmethylin
2, 4, 5- T	TCA	Paraquat	ACCase	Fluroxypyr	Quinmerac		Pyroxsulam	
Dinoseb	MCPB	CMPP	Glyphosate	DFF				
		HBNs	Clopyralid					
			Autumn-sown & min till	Direct drill	Straw burning ban		No till	Regen Ag
				PSII resistance	Resistance			
				CDA	GMHT			
	PSPS (1957)			FEPA (1985)	91/414	1107/2009		GB independent of EU (2021)
			BASIS (1978)	COPR (1986)		VI (2001)		

Chemicals
Products

11
104

36
260

72
452

81
461

119
1,346

112
1,560

94
1,497

84
1,386

1950s

1960s

1970s

1980s

1990s

2000s

2010s

2020s

Changing herbicide availability: Losses, new to UK, new to all



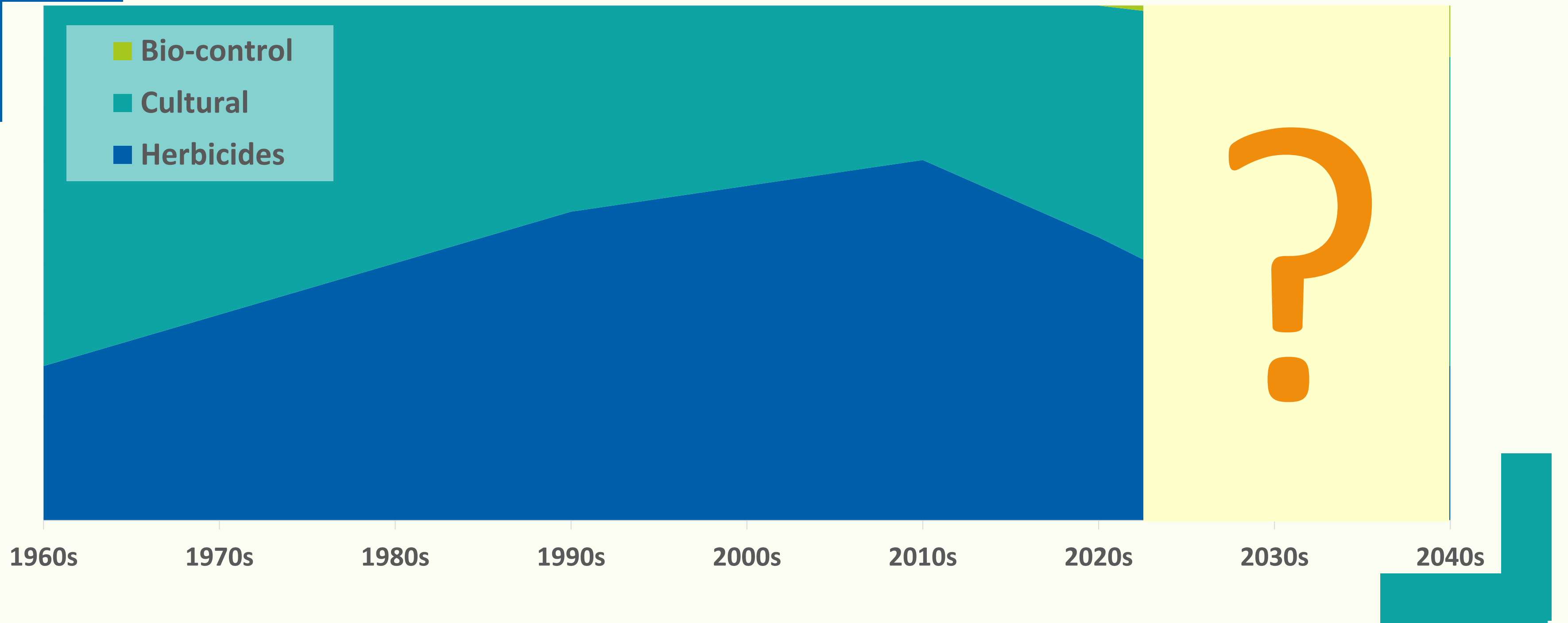
Active Substance	Introduction	No longer available*
Amitrole	1953	2016
Atrazine	1957	2004
Benazolin	1964	2002
Bromoxynil	1963	2020
Carbetamide	2000	2021
Chloridazon	1964	2018
Chlorpropham	1951	2019
Desmedipham	~1969	2019
Dichlobenil	1960	2008
Diquat		2018
Diuron	~1951	2020
Flupyr sulfuron	1998	2016
Flurtamone	1990	2018
Glufosinate	1982	2018
Imazamethabenz	1982	2005
Imazapyr	1985	2002
Ioxynil	1966	2015
IPU	1971	2016
Linuron	~1965	2017
Oxadiazon	1969	2018
Simazine	~1960	2005
Tepraloxym	1999	2015
Terbutryn	1966	2002
Tralkoxydim	1986	2019
Trifluralin	1961	2010

Active substance	Global	UK
Aclonifen	1980s	2019
Cinmethylin	1980s	2022
Metobromuron	1960s	2015
Prosulfocarb	1980s	2013

Active substance	UK
Aminopyralid	2015
Halauxifen	2015
Mesotrione	2005
Pinoxaden	2016
Pyroxsulam	2014
Quizalofop	2015

- * No longer available due to EITHER regulatory decision OR company decision
- Some active substances will have received rate or timing restrictions (e.g. to meet revised bird or mammal assessments, buffer zones)
- The future: Endocrine disruption? NTP or biodiversity? Water protection?

Changing balance of weed management practices



Weed control was manual and back-breaking work



Horsepower helped



Mechanical and technological assistance



Herbicide application



Alternative weed control approaches



Under new management



Wild-oats



Couch



Cleavers

Challenges for herbicides



- Herbicides of greatest concern for water quality
- Herbicide resistance
- Very challenging to develop & authorise new herbicides
- Non-target plants?
- Selectivity?
- Integrate herbicides & cultural
 - within field and rotation

Pesticide	Number of SgZs for pesticides
Bentazone	8
Metaldehyde	4
Atrazine	2
Other pesticides	2
Dichlorprop	1
Diuron	2
Mecoprop	2
Bromacil	1
Chlorotoluron	1
Linuron	1
Monuron	1
Oxadixyl	1
Picloram	1
Propyzamide	1
Simazine	1
Total	29

60th Annual BCPC Weeds Review: your reflections and experiences



60th Annual BCPC Weeds Review

This survey aims to collect reflections on weed management over the past 60 years and look into the future. By submitting your response, you will be agreeing that aggregated information may be used by the authors and BCPC to publicise the aggregated findings and for research purposes. Individual responses will not be identifiable in any summaries. *The survey closes to responses on 15 October.*

The 2023 BCPC Weeds Review marks 60 years of sharing experiences of weed control challenges and successes. To highlight this landmark, the organisers have asked some speakers to explore influences, changes and successes over the past 60 years which will also inform future needs. **We welcome your reflections** in this. The survey outcomes will provide a topic of discussion at the review on 2 November.

Please find about 10 minutes to provide your experiences on weed control in your career to date, and to help highlight emerging priorities. The [survey](#) (which may be shared with colleagues) will be open until **15 October** and is accessible to anyone with the [survey link](#) or by scanning the QR code. It is suitable PCs and mobile devices.

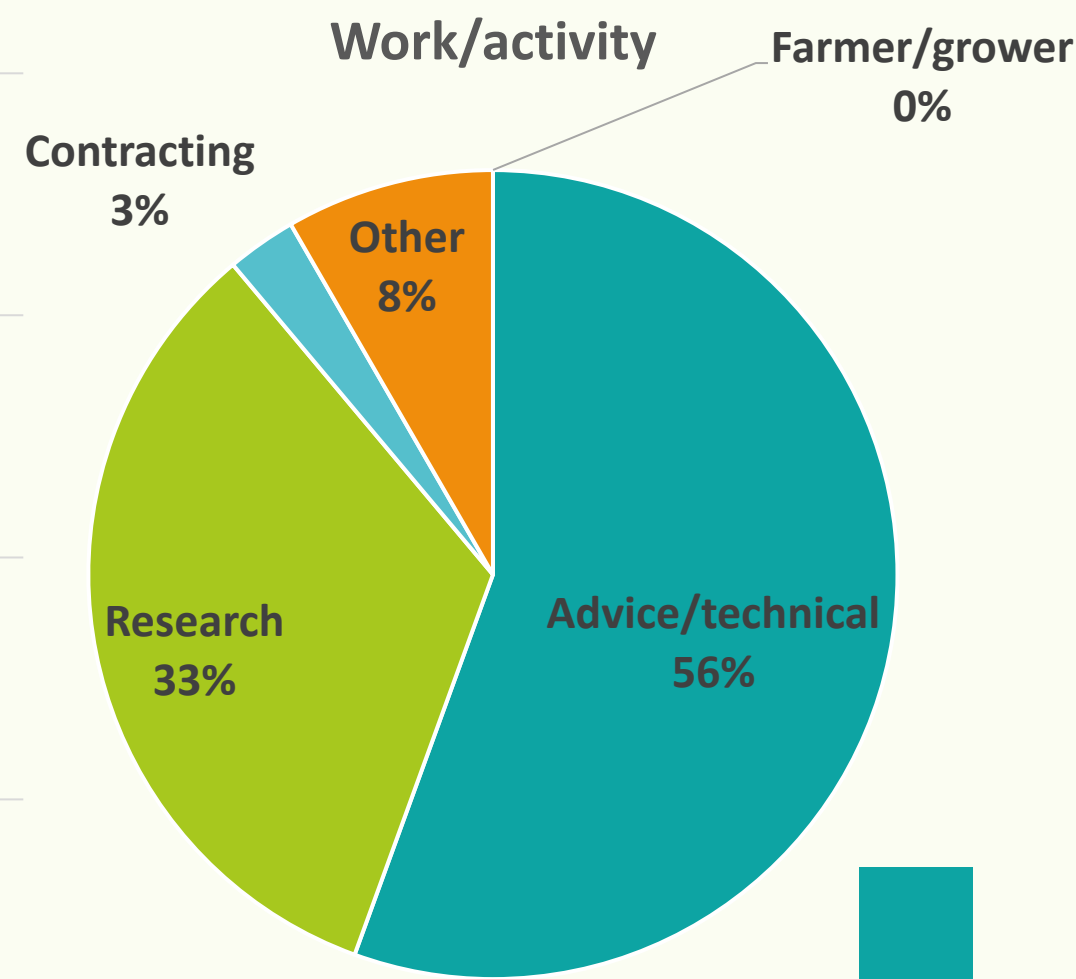
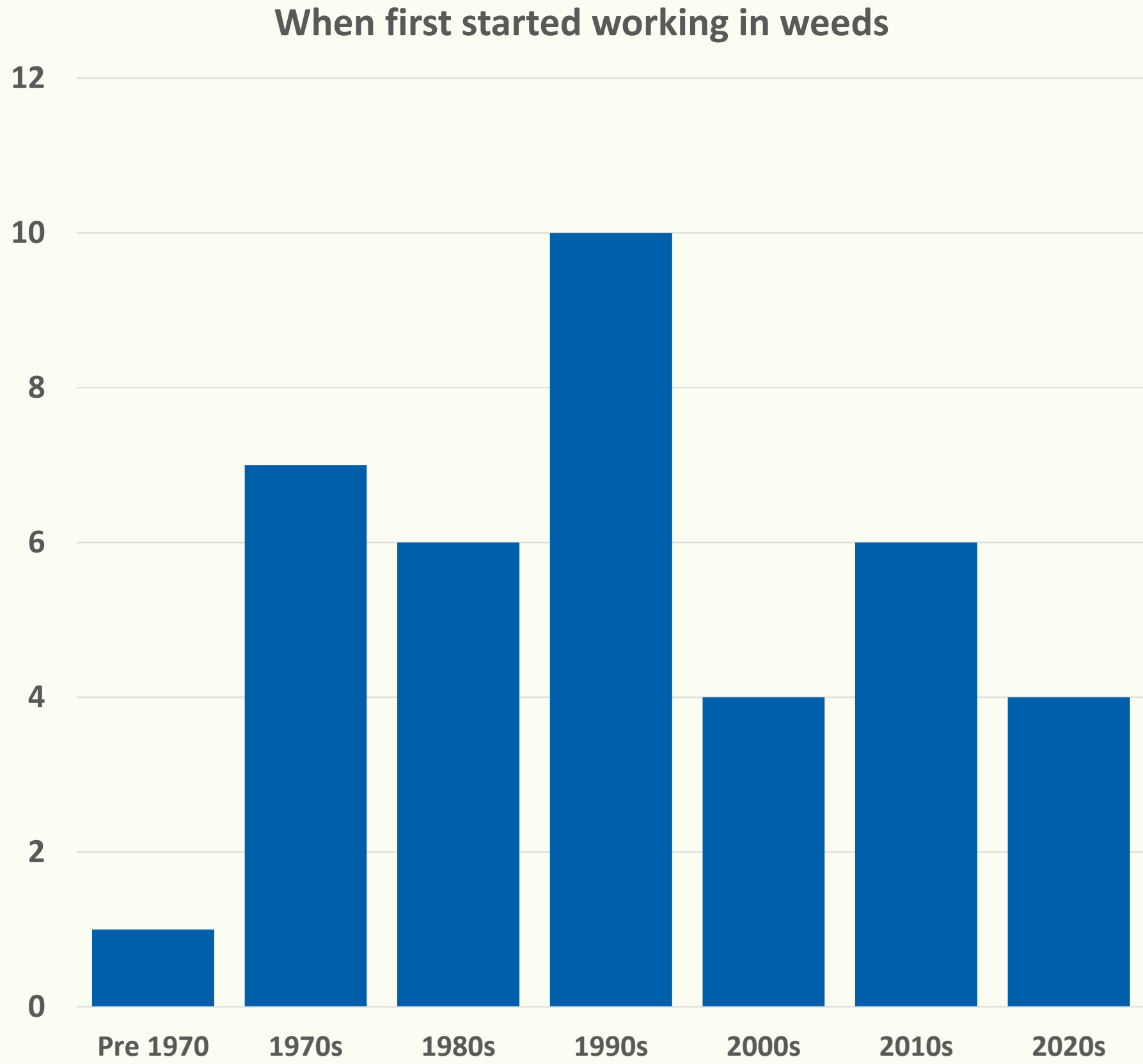
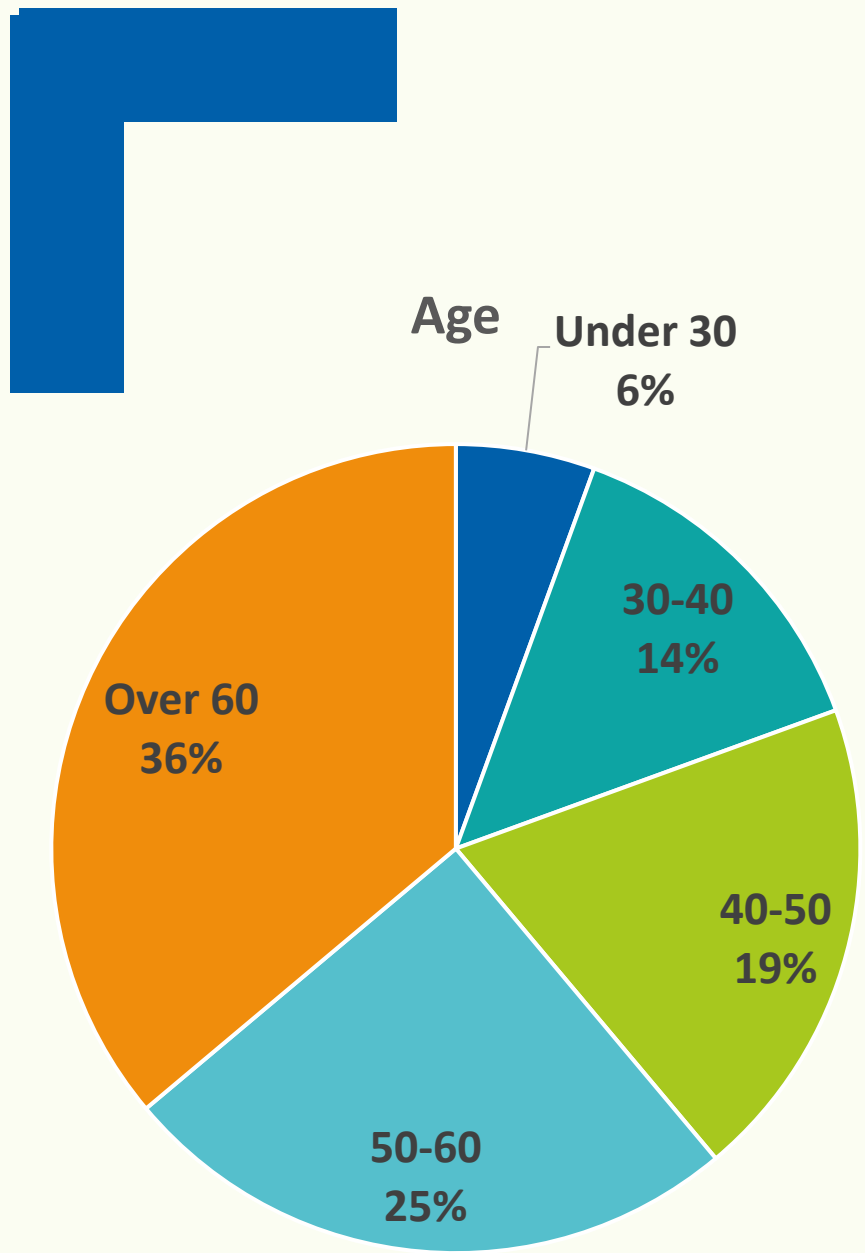
Thank you.

The survey is now open for responses again. Whilst this presentation only contains those submitted prior to 15 October, later responses will be used in future presentations or reports.

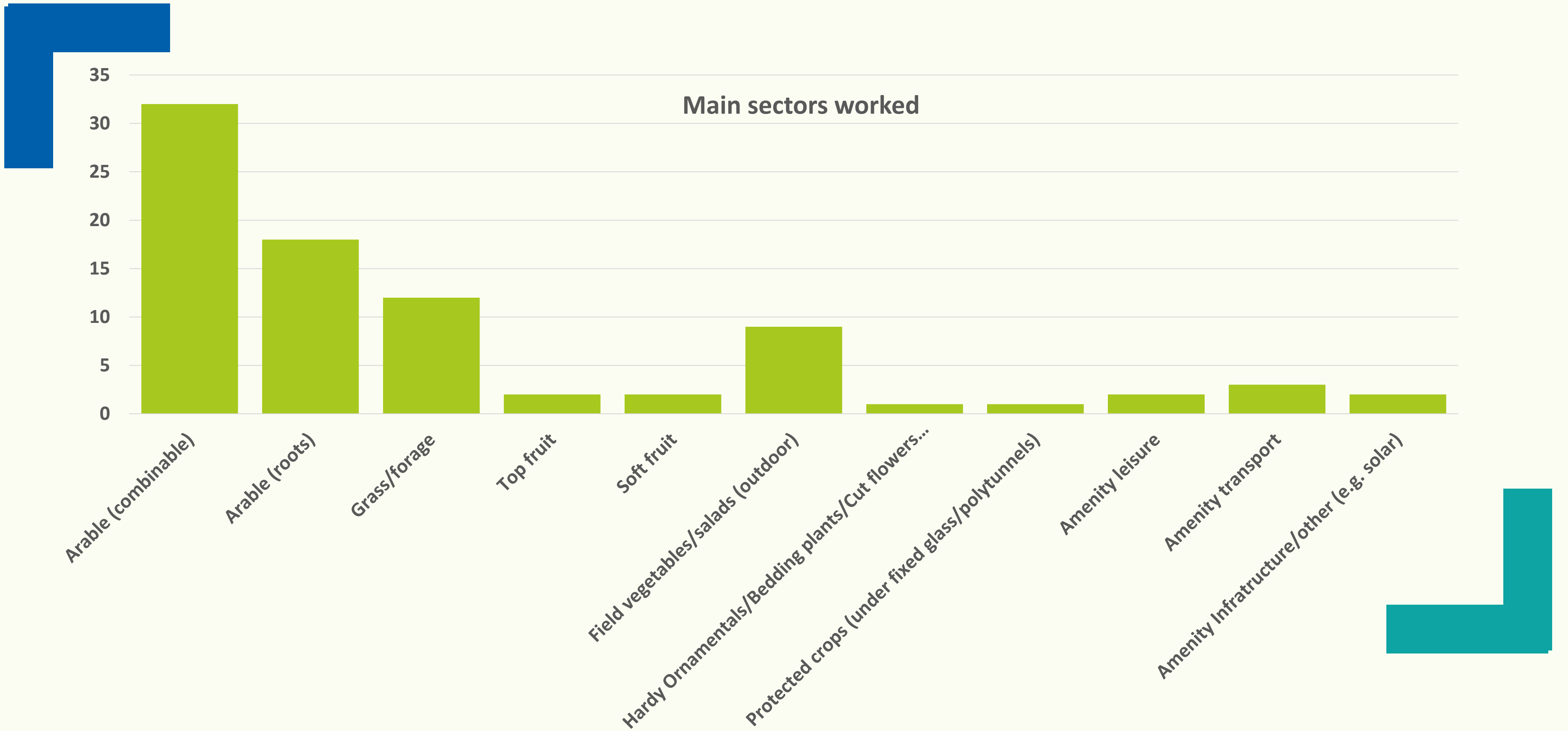
60th Annual BCPC Weeds Review



Profile of survey responses (36 received)



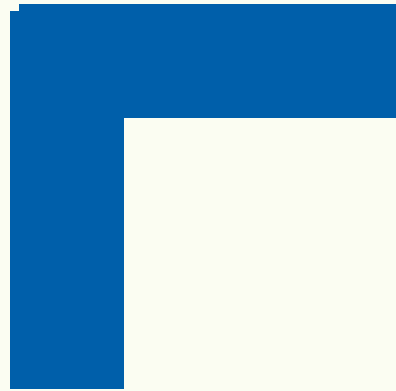
Profile of survey responses (36 received): mainly field crops



Profile of survey responses (36 received): distribution reflects main production



Worst weeds



■ Not important ■ Slightly important ■ Moderately important ■ Very important

Autumn germinating annual **grass-weeds**

Spring germinating annual **grass-weeds**

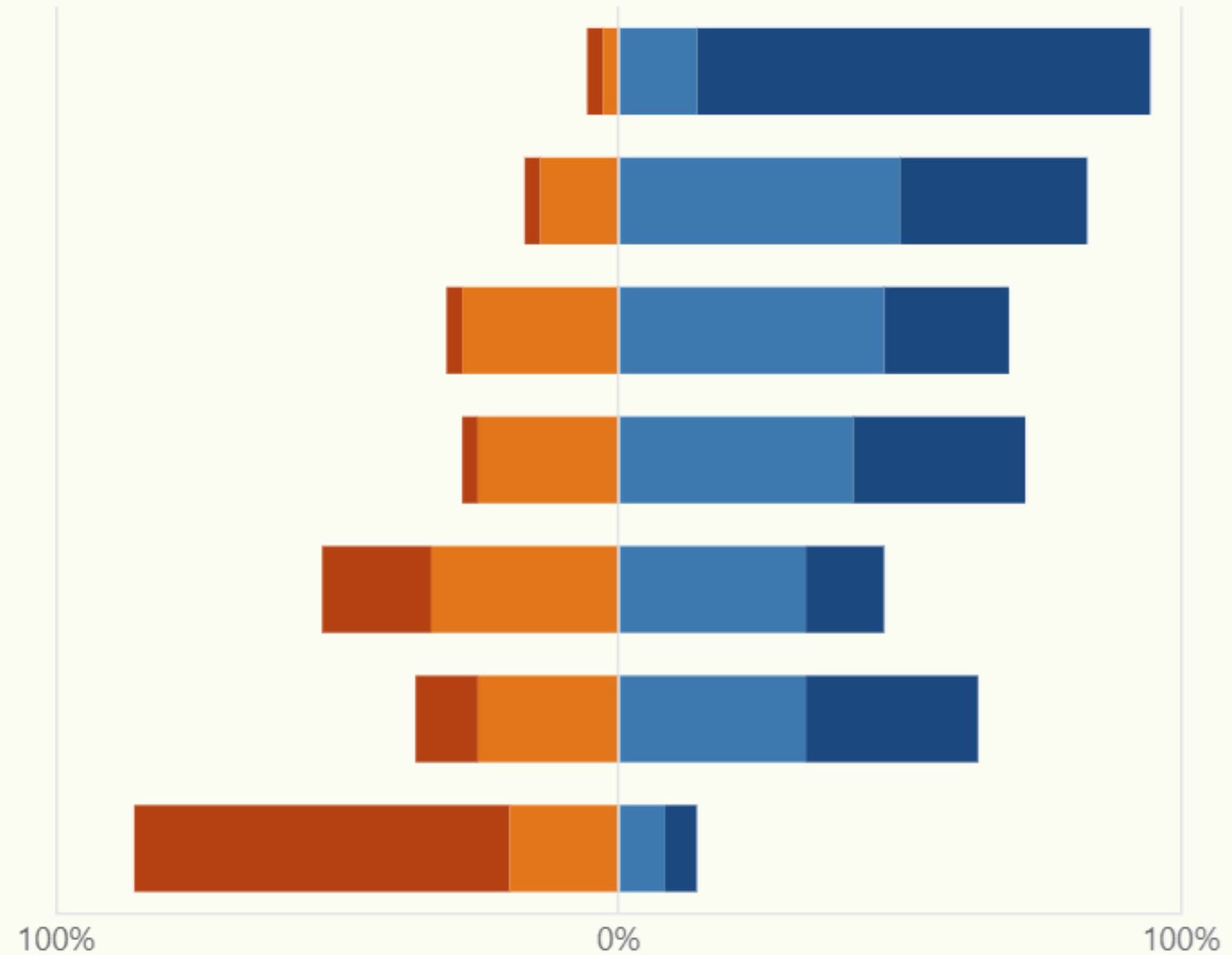
Autumn germinating annual **broad-leaved weeds**

Spring germinating annual **broad-leaved weeds**

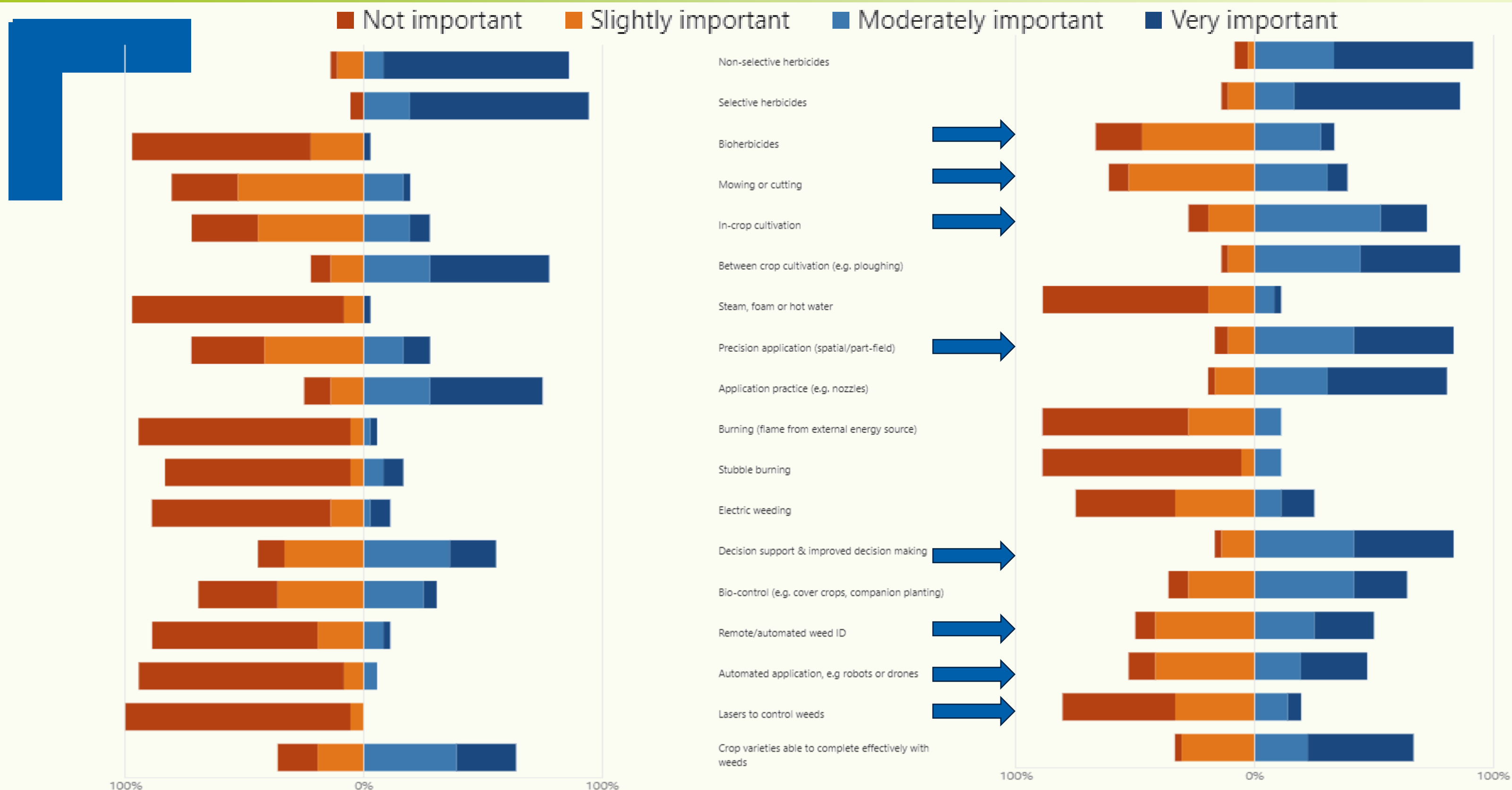
Perennial grass weeds

Perennial broad-leaved weeds

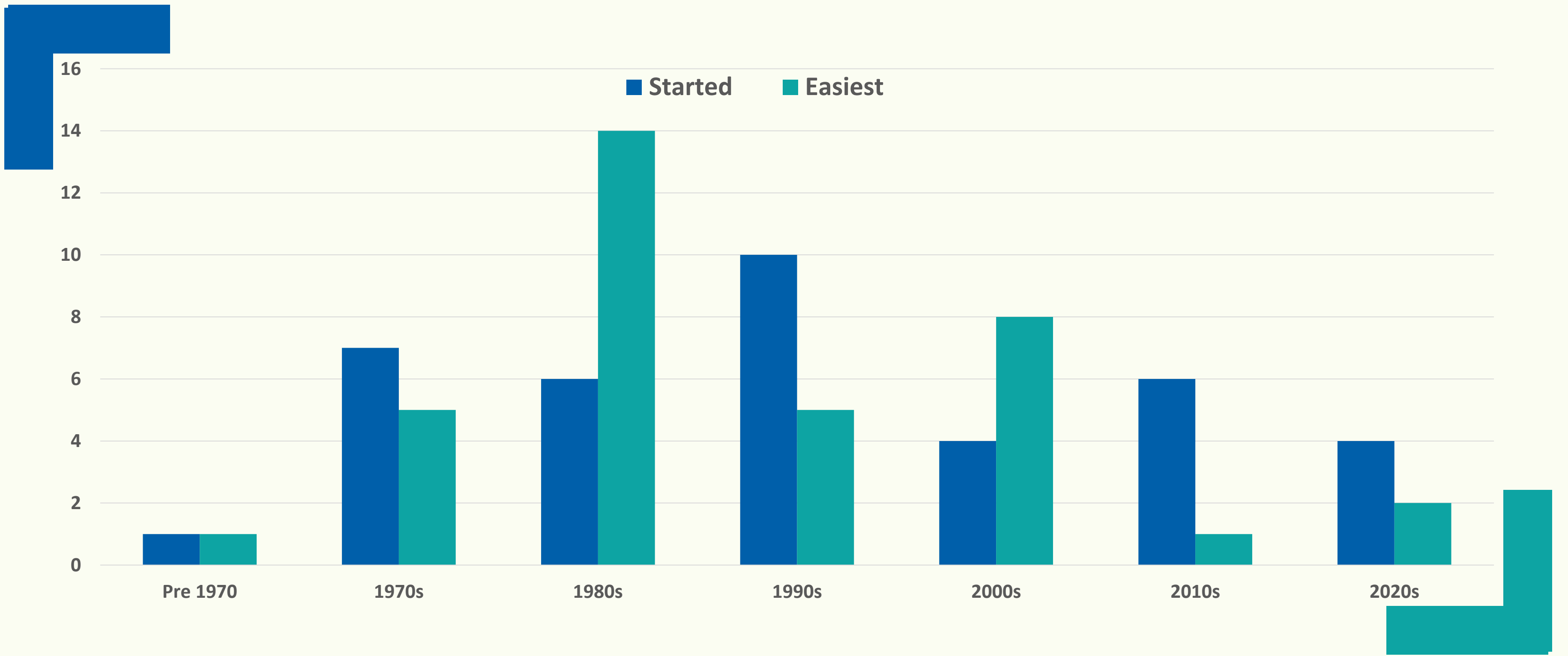
Other



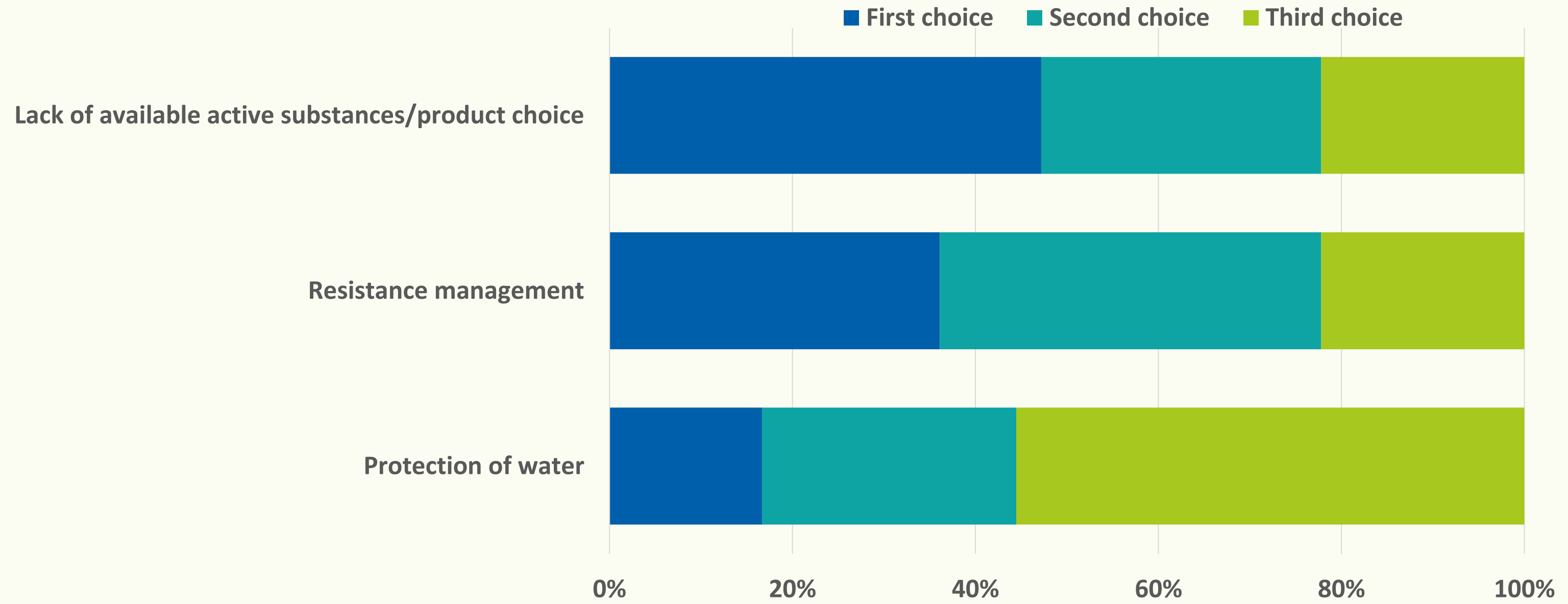
Importance of weed management measures: to date (left) and in 10 years (right)



Decade when weed management was easiest and most successful



Challenges in next 5-10 years



Views on the future



■ Not at all ■ Unlikely ■ Possibly ■ Probably ■ Very likely

Farmers and society will accept more weeds

Crop rotations will change due to weed issues

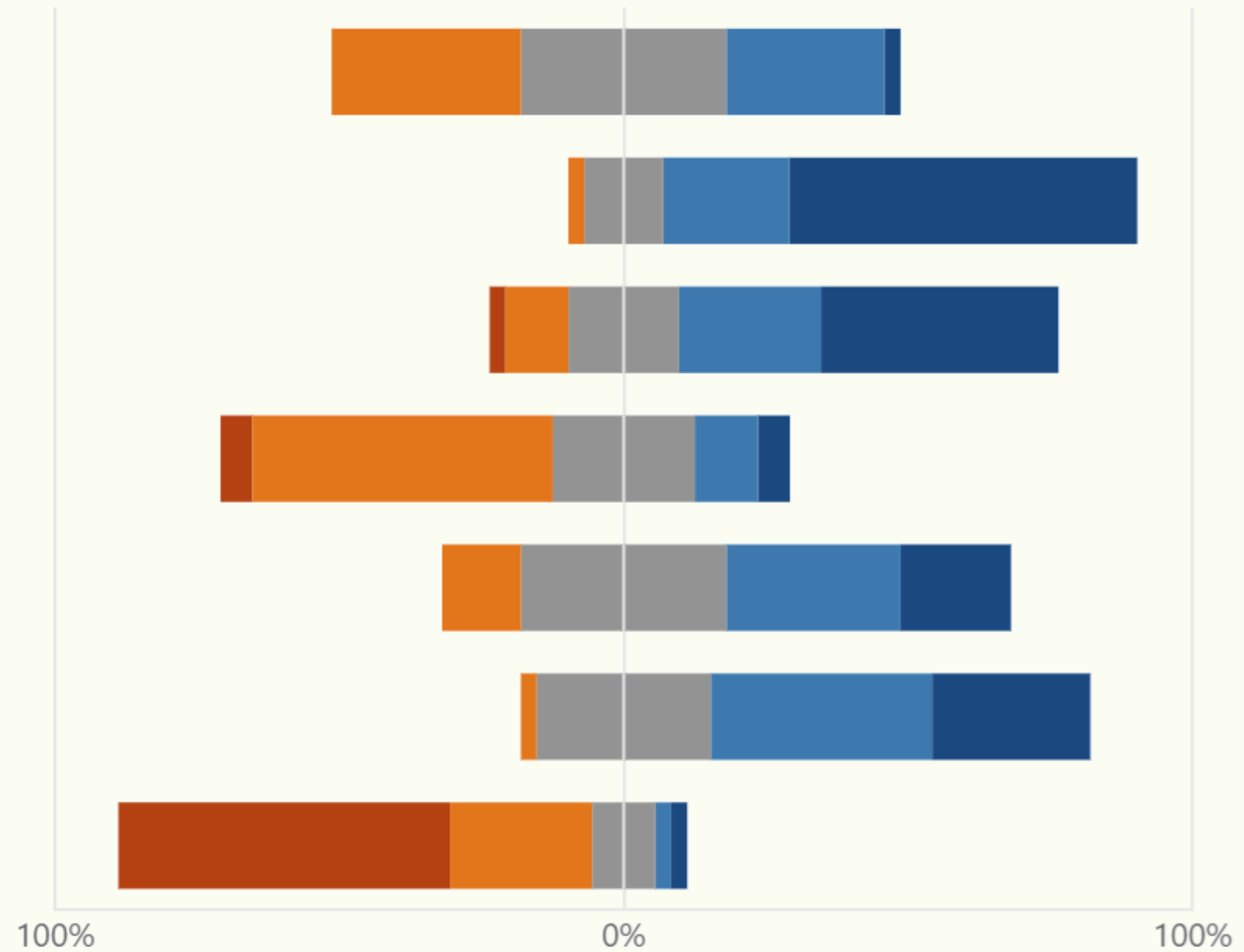
Glyphosate will be a major control option

Bioherbicides will be common in 10-15 years

Application technology will revolutionise our opportunities

Precision/part-field spraying will be common place

Stubble burning will return



Attempts to change from chemical to mechanical divide opinion

The Argus

Brighton: Council criticised after asking for volunteers to pick weeds



Brighton and Hove City Council has been criticised for asking for volunteers to help pick weeds (Image: Argus Archive)

The council has been told to weed the pavements itself after an "outrageous" scheme asking for volunteers to help do the task by hand.

Brighton and Hove City Council has come under fire for calling for "weed warrior" volunteers to help its staff clear the **city's 975,000km of pavements**.

It has been trialling manual techniques such as mechanical sweepers, industrial grade trimmers and "good old fashioned hoes" since **the decision to ban toxic chemical weedkillers in 2019**, under the Labour administration.

<https://www.theargus.co.uk/news/23405314.brighton-council-criticised-asking-volunteers-pick-weeds/>

The Telegraph

Unsafe and 'looking like a dump': How Brighton's controversial eco policy went to seed

The council's decision was well-intentioned – but created a city full of unsafe, overgrown roads and pavements

By Boudicca Fox-Leonard
4 September 2023 • 2:50pm



Every week Ivan Lyons receives emails from residents with photos and stories about how the weeds outside their homes have become a blight

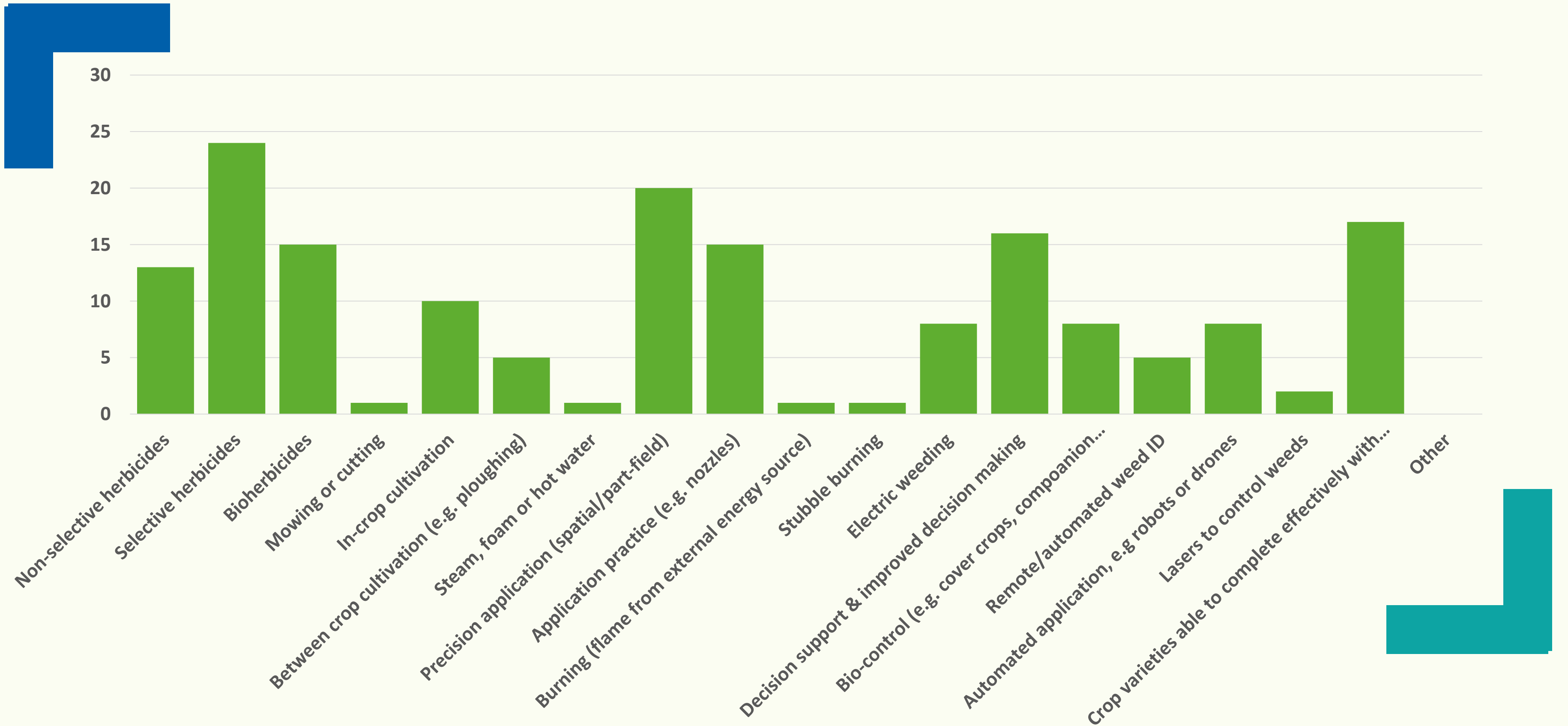
<https://www.telegraph.co.uk/environment/2023/09/04/brighton-hove-green-party-rewilding-eco-policy-dump-weeds/>

Some selected thoughts from respondents



- “Glad I’m retiring!”
- We need to change (rotation, strategy, cultivation) – for resistance, lack of alternatives. We cannot just rely on chemistry.
- Need more targeted application (nozzles, water volumes).
- “Humans are better at reducing the impact of weed competition but evolution keeps setting the bar higher“.
- “IWM is the way forward to reduce resistance increasing further. Horticulture/field veg needs to try and reduce the massive spend on hand weeding.”
- “trends and fads e.g. mintill and regen are not all they are cracked up to be and could be inadvertently more damaging” [than some smoke from straw burning].
- “Politics and pressure groups will lead to further loss of herbicides. Alternatives are cultivation and loss of soil carbon as CO₂ or electric weeding. Neither will be as effective as current herbicides so will be a need to accept more weeds as well as growing more competitive crops where possible. Improved decision making should help results.”
- We need help and investment to make better decisions; based on science not politics.

Priorities for R&D investment



- Weeds not seen as bad by all & divide opinion.
- 60 years of significant change & challenge.
- Weed science led UK & World; resulted in formation of BCPC (1953); 1964 1st weed review.
- Herbicides peaked; future challenges will mean greater integration with other measures.
- Annual & arable weeds still dominate; others (e.g. perennial BLW) are just as important in specific situations.
- Herbicides will remain important with challenges: availability, resistance, authorisation.
- Demand for improved prediction, decision support (of need & impact) & weed detection.
- Targeting & application practice & formulation improvements could help.
- Investment needs: new knowledge and KE.
- BWCC objectives still highly relevant.

BWCC Objectives were:

To promote and encourage science and practice of weed control.

To organise conferences on weed control, to publish and sell or otherwise distribute the reports of the proceedings.

To disseminate information on weed control.

To collaborate with other organisations the objects of which are to encourage the science and practice of crop protection.

To do all other lawful things incidental or conducive to the above objectives.



Thank you
For listening & contributors

BCPC Annual Review of Weed Control, 2 November 2023

