Table S1. Survey utilized to assess context, knowledge, experiences, and perceptions regarding environmental conditions, management practices, production challenges, and research needs of agricultural stakeholders in Montana, USA.

Question	Dataset
What county(ies) do you primarily operate in?	Multiple choice
How long have you been in your agricultural profession?	Multiple choice
What type of agricultural systems do you work in?	Multiple choice
What is the average number of acres of the systems on which you operate?	Multiple choice
How much rainfall does your area of operation receive annually?	Multiple choice
Do you use any type of tillage?	Multiple choice
Rank the crop that you have observed are the easiest to produce	Multiple choice
What factor influence yields most?	Multiple choice
Describe the crop rotation you most commonly use	Multiple choice
Do you recommend a green manure (cover crop) as part of your rotation?	Multiple choice
Please list the crops you incorporate or recommend in a green manure	Multiple choice
How much cropland do you recommend	Multiple choice
Do you think green manure compromises soil moisture and nutrient availability?	Multiple choice
Would you recommend incorporating livestock to manage green manure/cover crops?	Multiple choice
What crops are most influenced by weeds?	Multiple choice
What are your ten most problematic weeds and how difficult are they to manage?	Multiple choice
Would you recommend incorporating livestock to manage weeds?	Multiple choice
What crops are influenced the most by disease?	Multiple choice
What are your five most problematic diseases and how difficult are they to manage?	Multiple choice
What are your five most problematic insects and how difficult are they to manage?	Multiple choice
How frequently do you test you soil or recommend soil testing?	Multiple choice
How many fields do you soil test or recommend soil testing each year?	Multiple choice
Which crops do you feel face the biggest challenge to market?	Multiple choice
What crops are influences the most by insects?	Multiple choice
Do you use or recommend soil fertility test?	Multiple choice
What is the most challenging agricultural issue you deal with?	Open-Ended
What factors influence your choice of crop rotations most?	Open-Ended
What weed research do you feel is most needed?	Open-Ended
What disease research do you feel is most needed?	Open-Ended
What insect research do you feel is most need?	Open-Ended
What factors determine whether you add or recommend adding fertilizer?	Open-Ended
What soil fertility research do you feel is most needed?	Open-Ended
What marketing research do you feel is most needed?	Open-Ended
What are your experiences with no-till?	Open-Ended
What research do you feel would be the most beneficial to your operation?	Open-Ended
Where do you get your farming information?	Open-Ended
Please describe any on-farm research you are conducting?	Open-Ended

Table S2. Domains (underlined) and subdomains used to identify recurring themes in open-ended questions of the survey utilized to assess context, knowledge, experiences, and perceptions regarding environmental conditions, management practices, production challenges, and research needs of agricultural stakeholders in Montana, USA.

Question: What is the most challenging agricultural issue you deal with?

Domains and subdomains	**Codes**
Economic	ec
Costs (e.g., price of fertilizer or labor wages)	cost
Marketing (e.g., finding a distributer or bulk buyer)	mark
Production (e.g., producing a sellable crop)	pro
Losses (e.g., yield losses to a pest)	loss
Time (e.g., having enough time to implement desire management regime)	tim
Social	soc
Personal Relationship (e.g., neighbors judgements prevent producer from using a new agronomic practice)	pr

Policy and Regulation (e.g., constraint of crp prevent more intensive pest management)	pol
Knowledge/Research (e.g., producer doesn't know how to best manage a pest)	kno
Labor Personnel (e.g., producer has to train farm workers every year because turn over is high)	lab
Communication (e.g., A researcher feel his/her recommendations fall on deaf ears)	com
Sustainability (e.g., A producer has a hard time getting acceptable yield while minimizing deleterious impacts on surrounding environment)	sust
Land ownership (e.g., A producer lease his/her land and is constrained by the management regime of the land owner)	land
Agroecological	agec
Weeds (e.g., managing Bromus tectorum)	weed
Phytophagous Insects (e.g, wheat stem sawfly)	ins
Pathogens (e.g., managing wheat streak mosaic virus)	path
Pollinators (e.g., attracting enough pollinators to obtain acceptable yields of bee pollinated crops)	poll
Vertebrate herbivores (e.g., Deer, gophers)	herb

Natural Enemies (e.g., parasitoids and predators of alfalfa weevil)	enm
Crop plant physiology, health and quality (e.g., leaf area index, canopy height, assimilation)	crop
Evolved Resistance to pesticides (e.g., managing multiple herbicide resistant Avena fatua)	res
Environmental	Env
Soil Properties (available nutrient content, CEC, texture, porosity, organic matter, compaction)	soil
Climatic factors (e.g, growing degree days, precipitation, elevation)	clim
Natural Disturbances (e.g., hail, windstorms, flooding, fire)	dist
Nutrient Cycling (e.g. C:N in cover crops, nutrient uptake, leaching etc)	nut
Hydrologic factors (e.g., moisture, evapotranspiration, precipitation)	hyd
Agronomy and management	Mgt
Rotations/Crop Diversity (e.g., finding a good rotation to break pest cycles)	rot

Fertility (e.g., adding enough fertilizer to provide adequate yields)	fert
Equipment (e.g., having the proper machinery to manage efficiently)	eqp
Pesticides (e.g., avoiding residual effects of a synthetic auxin like 2,4-D)	pest
Irrigation (e.g., Having to water his or her crop and getting appropriate water rights)	irr
Tillage (e.g., trying to time soil cultivation to minimize erosion)	till
Fallowing (e.g., balancing the need to fallow to increase soil moisture with avoiding erosion or weed infestations)	fall
Seeding/Propagation (e.g., farmer has difficulty seeding following no-till because surface soil has high penetration resistance)	seed
Labor Intensity (e.g., managing a weed mechanically on an organic veggie farm requires too much work)	int
Legacies/history (e.g., by not fallowing for two years not enough soil moisture to grow a cover crop)	leg
Controlled burns (e.g., farmer can't get proper conditions to burn crop residue)	burn
Yield (e.g., managing pests and fertility to achieve acceptable yields)	yld
Crop varieties (e.g., buy wheat seeds that will resist wheat stem sawfly infestations)	var
Acreage (e.g., having too much or too little land to perform a desire practice)	acre

Specific inputs (e.g., farmer has hard time rotating modes of action to avoid selecting for resistance while getting acceptable weed mortality)	inpt
Timing (e.g., seeding early enough to accumulate necessary degree-days)	tmng
Processing (e.g., farmer can't get equipment to clean seeds in a timely fashion)	prcs

Question: What factors influence your choice of crop rotations most?

Domains and subdomains	**Codes**
Economic	ec
Costs (e.g., some seeds are too expensive to buy and plant many years in a row)	cost
Marketing (e.g., price per bushel a producer can get for a crop)	mark
Production (e.g., yield potential given crop, fertility, and moisture)	pro
Losses (e.g., amount of yield lost to pests)	loss
Time (e.g., having enough time to implement desire management regime)	tim
Contracts (e.g., bound by a future contract or land owner contract if renting)	cntc

Social	soc
Personal Relationship (e.g., follows neighbors do)	pr
Policy and Regulation (e.g., plant based on rules for organic certification)	pol
Knowledge/Research (e.g., producer's experience leads him/her to select best crops)	kno
Labor Personnel (e.g., availablity of farm workers to plant or harvest)	lab
Communication (e.g., a consultant recommends a rotation to a grower)	com
Habits/goals (e.g., grower always grows the same things in the same rotation no matter what)	hab
Sustainability (e.g., producer plant crops to avoid adverse environmental effects)	sust
Agroecological	agec
Weeds (e.g., producer plant smother crop to manage canada thistle)	weed
Phytophagous Insects (e.g., producer grows two years of oilseed and pulse crops following wheat to keep wheat stem sawfly pressure low)	ins

Pathogens (e.g., producer fallows to avoid green bridge for wheat curl mite)	path
Crop plant physiology, health and quality (e.g., leaf area index, canopy height, assimilation)	crop
Evolved Resistance to pesticides (e.g., producer plants a cereal grain to avoid spraying EPSP inhibitors, thus reducing selection for resistace)	res
Environmental	env
Soil Properties (e.g., penetration resistance, texture, CEC)	soil
Climatic factors (e.g., growing degree day accumulation)	clim
Nutrient Biogeochemistry (e.g., producer plants legume to fix N)	nut
Hydrologic factors (e.g., soil moisture, precipitation)	hyd
Geography (e.g., producer is growing at high elevation)	geo
Management	mgt
Fertility (e.g., nutrient content of soil)	fert

Equipment (e.g., having the right seed drill to plant desired crop)	eqp
Pesticides (e.g., what herbicides are available to the producer)	pest
Irrigation (e.g., having water rights to meet irrigation needs)	irr
Tillage (e.g., a producer decides what to plant on whether or not he/she could till)	till
Fallowing (e.g., a producer plants a less water use efficient crop because he/she was able to fallow previous year)	fall
Seeding/Propagation (e.g., what is easiest to seed is what a producer grows)	seed
Labor Intensity (e.g., a grower chooses his/her crop based on farm wokers available)	int
Legacies/history (e.g., a grower plants his/her crops based on what he/she grew last year)	leg
Livestock Integration (e.g., a grower plants according to his/her livestock feed needs)	live
Crop residue management (e.g., a grower plants what grows most easily through a dense layer of thatch)	resid
Crop rotation (e.g., what year it is in a predetermined crop rotation)	rot
Cover crops (e.g., planting a cover crop to prevent erosion or enhance soil nutrient status)	cov

Question: What weed research do you feel is most needed?

Domains and subdomains	**Codes**
Specific Species or Functional Groups	spec
Monocots (grasses, rushes, sedges)	monc
Dicots (broadleaf species)	dico
Kochia (*Bassia scoparia*)	kosc
Canada thistle/creeping thistle (*Cirsium arvense*)	ciar
Cheat/cheatgrass/downy brome (*Bromus tectorum*)	brte
Field bindweed/morning glory/creeping jenny (*Convulvus arvensis*)	coar
Blue lettuce (*Lactuca tartarica*)	lata
Prickly lettuce (*Lactuca serriola*)	lase
Foxtail barley (*Hordeum jubatum*)	hoju
Prairie junegrass (*Koeleria macrantha*)	koma

Pigeon grass/Green foxtail (*Setaria virdis*)	sevi
Hoary cress/whitetop (*Lepidium draba*)	ledr
Hoary alyssum (*Berteroa incana*)	bein
Quackgrass (*Elymus repens*)	elre
Hounds tongue (*Cynoglossum officinale*)	cyof
Wild oat (*Avena fatua*)	avfa
Jointed goatgrass (*Aegilops cylindrica*)	aecy
Leafy spurge/spurge (*Euphorbia escula*)	eues
Narrowleaf hawksbeard (*Crepis tectorum*)	crte
Knapweed (*Centaurea* sp.)	cent
Oxeye daisy (*Leucanthemum vulgare*)	levu
Mare's tail (*Conzya canadensis*)	coca
MT noxious weeds (state listed)	mtno

Persian darnel (*Lolium persicum*)	lope
Chickweed (*Stellaria media*)	stme
Ryegrass (*Lolium multiflorum*)	lomu
Perennial weeds	pern
Annual weeds	ann
Biennial weed	bi
Bulbous bluegrass (*Poa bulbosa*)	pobu
Integrated Pest (Weed) Management	ipm
Cultural control (e.g., crop rotations, and cover cropping)	cult
Mechanical control (e.g., mowing and tillage)	mech
Prevention (e.g., reducing seed rain; increased density dependent mortality)	prev
Unspecified IPM	uipm

Biological Control	ctrl
Conservation (e.g, creating habitat for native seed predators)	cons
Classical (e.g., introducing a parasite from an invasive plant's native range notnative)	clas
Inundative/augmentative (e.g., culturing and spreading spores of a native seed pathogen)	aug
Livestock integration (e.g., allowing sheep to graze an infestation of Euphorbia escula)	live
Unspecified biological control	unbc
Herbicides	herb
Altering modes of action (e.g., using an epsp inhibitor like glyphosate one year; then a synthetic auxin like clopyralid the next year)	mode
New chemistries (e.g., finding an herbicide that denatures rubisco)	chem
Resistance (e.g., surviving applications of als inhibitors)	evol
Efficacy (e.g., what is the percent control on a specific weed of a new herbicide?)	eff

Residues (e.g., what is the leaching potential of a new herbicide, impact on next crop basd on persistence)	resid
Herbicide use	use
Alternatives to synthetic pesticides	alt
Biology	biol
Physiology (e.g., how does a particular species metabolize a certain mode of action?)	phys
Demography/population ecology (e.g., by reducing seed rain a certain percentage, how will the density of a particular species change?)	pop
Communities (i.e., can a particular land management practice favor a more desirable assemblage of species?)	comm
Phenology (e.g., will a particular species emerge earlier in the season under predicted climate change?)	phen
Landscape ecology/dispersal (e.g., what is the best management practice to minimize the spatial spread of a weed?)	disp
Basic research (e.g., how is a particular species pollinated?)	bas
Ecosystem ecology (e.g., nutrient cycling, climate change impacts)	ecos
Applied research (e.g., what is the best practice to control B. tectorum in pulse crops?)	appl

Agronomic	agro
Genetically Engineering/Transgenic (e.g., Glyphosate resistant crops)	tran
Yield losses (e.g., competitive exclusion by weeds)	loss
Competitive Cultivars (e.g., breeding taller varieties of wheat)	var
Grains	grn
Vegetables	veg
Pulses (legumes, eg peas chickpeas lentils)	pul
Fruit	frt
Oilseed	oil
Forage/range	for
Management time	tim

Economic	ec
Thresholds (i.e., at what density of a particular weed does yield loss warrant management?)	thrsh
Cost/Benefit analyses (e.g., does non-target mortality to pollinators or natural enemies outweigh the reduction in weed pressure from the use of herbicides?)	cba
Social	soc
Sustainability	sus
Education/outreach	edu

Question: What disease research do you feel is most needed?

Domains and subdomains	**Codes**
Specific Diseases or Disease Classes	spec
Fusarium (including snow mold, unspecified blight)	fus

Ascochyta	asc
Tan spot (*Pyrenophera tritici-repentis*)	tan
Wheat streak mosaic virus	wsmv
Rust (*Puccinia* sp.)	wsr
Cercospora/leaf spot	cerc
Unspecified root rot	root
Rhizoctonia	rhiz
Aphanomyces/root rot	aph
Smut/tilletia	smut
Soil-borne (including root)	sb
Fungal	fung
Viral	vir
Foliar	fol

Scab (streptomycers-on tubers)	scab
Net blotch (net form net blotch)	nfnb
Crown diseases	crwn
Powdery mildew	powm
Seed born	seed
Alternaria	alta
Management	man
Cultural control (e.g., crop rotations, and cover cropping, timing (when to plant, fertilize etc)	cult
Resistant crop varieties	var
Biocontrol	bio
Fungicides	fcide
Alternatives to pesticides	alt

Reducing non target effects	red
IPM	ipm
Ecological	ecol
Vectors (organisms that transmit a diseas from one individual to another)	vect
Landscape ecology/dispersal	disp
Green bridge (resevoirs of disease propagules)	gb
soil ecology (e.g., how bacteria interact to in soil to influence root rot occurrences)	soec
abiotic	abio
evolved resistance	evol
Economic	ec
Thresholds (i.e., at what density of a particular weed does yield loss warrant management?)	thrsh

Cost/Benefit analyses (e.g., does non-target mortality to pollinators or natural enemies outweigh the reduction in weed pressure from the use of herbicides?)	cba
Yields (loss or increase)	yld
Marketing	mark
Specific Crops	crop
Alfalfa	alf
Wheat	wht
Barley	bar
Chickpeas/garbonzo beans	garb
Lentils	len
Unspecified pulses	puls
Peas	pea
Millet	mil

Potatoes	pot
Grains (unspecified)	grn
Vegetables	veg
Lettuce	let
Greenhouse crops	grnh
Varieties (more resistant)	var
Soybean	soy
Solanaceae	sola
Cucurbitaceae	cucu
Social	soc
Communication/education	edu

Other	othe
No problems with disease	nopr

Question: What insect research do you feel is most need?

Domains and subdomains	**Codes**
Specific Insects Pests	spec
Sawflies (Hymenoptera:Symphyta)	sym
weevils (Coleoptera:Curculionidae)	cur
Wireworm/click beetles (Coleoptera:Elateridae)	ela
Aphids (Hemiptera:Aphidae)	aph
Armyworms/cutworms/owlet moths/cabbage worms (a.k.a. cabbage loopers) (Lepidoptera:Noctuidae)	noc
Flea beetles (Coleoptera:Chyrsomelidae)	chry

Midges (Diptera:Cecidomyiidae)	cec
Grasshoppers/locusts (Orthoptera:Acrididae)	acr
Leafhoppers/hoppers (Hemiptera:Cicadellidae)	cic
Lygus bugs (Hemiptera:Lygidae)	lyg
Leaf miners (Diptera, Lepidoptera, Hymenoptera larvae)	mine
Mites e.g., spider mite; wheat curl mite (Arachnida:Acari)	acri
Onion and root maggots (Diptera:Anthomyiidae)	anth
Mosquitoes (Diptera:Culicidae)	culi
Symphyla (Centipedes)	sphl
New pests	npst
Beneficial Insects	Ben
Natural enemies (i.e., parasitoids and predators of phytophagous insects)	nat

Pollinators	Poll
Unspecified beneficial	Unbe
Specific Crops	Crop
Wheat	Wht
Barley	Bar
Chickpeas/garbonzo beans	garb
Lentils	len
Peas	pea
Sunflowers	hean
Millet	mil
Potatoes	pot
Pulses/legumes (Fabaceae)	leg

Grains	grn
Vegetables	veg
Lettuce	let
Hay	hay
Economic	ec
Thresholds (i.e., at what density of a particular weed does yield loss warrant management?)	thrsh
Cost/Benefit analyses (e.g., does non-target mortality to pollinators or natural enemies outweigh the reduction in pest pressure from the use of insecticides?)	cba
Effects on yields (i.e., loss or gain in crop yields)	yld
Integrated pest management	ipm
Cultural control (e.g., crop rotations, and cover cropping)	cult
Mechanical controls (e.g., tillage)	mech

Resistant crop varieties	var
Classical biocontrol (any organism including insects introduced to contol a plant-eating pest)	bio
Prevention	prv
Insecticides	icide
Alternatives to pesticides	alt
Reducing non-target effects	red
Conservation biocontrol (altering management regime to enhance predation or parasitism on pests)	cbc
Unspecified IPM	uipm
Transgenic crops / GMOs	gmo
Fertility (e.g., avoiding overfertilizing so plants invest in secondary metabolites)	fert
Ecological effects	ecol
Demography/populations (estimating the density of a particular species given a set of management practices)	pop

Landscape and dispersal (spatial and temporal dynamics of crops, pest and enemies)	land
Communities	comm
Evolved resistance	evol
Abiotic factors	abio

Question: What factors determine whether you add or recommend adding fertilizer?

Domains and subdomains	**Codes**
Economic	ec
Input costs	cost
Marketability (producing a crop that can sell)	mark
Product availability	avl
Yield losses	loss
Land ownership (own or lease)	land

Labor intensity/time	time
Agronomic (inputs and outputs of agriculture)	agro
Desired yield	yld
Legacy effects/history (e.g., was the field fertilized in previous season; what crop was grown previously)	leg
Soil test/soil chemistry	test
Plant tissue test	tiss
Crop/ crop rotation/fallow (what's growing now/in future)	crop
Protein/nutritive quality	pro
Equipment	eqp
Management system (e.g., convention vs. organic)	mgt
Precision agriculture	prag
Irrigation	irr

None added/don't fertilize	none
Environmental and agroecology	env
Precipitation/moisture	mstr
Plant community	comm
Leaching potential/volatilization	lch
Soil physical properties (texture)	spp
Social	soc
Knowledge/experience and lack thereof	kno
Habit	hab
Short and long term goals	goals
Recommendations	rec

Sustainability	sust

Question: What soil fertility research do you feel is most needed?

Domains and subdomains	**Codes**
Economic	ec
Input costs	cost
Yield losses	loss
International trade	trd
Return on investment (ROI)	roi
Agronomic	agro
Legacy effects/history	leg
Cover crop/green manure	cov

Crop/ crop rotation	crop
Management system (e.g., convention vs. organic)	mgt
Precision agriculture	pag
Specific inputs (a product such as anhydrous ammonia or potash - fertilizers)	inp

Question: What marketing research do you feel is most needed?

Domains and subdomains	**Codes**
Revenue streams	sell
Locating buyers	buy
New markets (e.g., selling Pardina lentils to Spain)	nmrk
Market niche (e.g., targeting farm-to-table restaurants)	nch
Pricing	pric

Prediction	pdct
Diversification (of product)	div
Future/Forward Contracts and stockmarket bullshit	con
Ecosystem services (e.g., carbon sequestration, water purification, pollination)	esrv
Seasonality	seas
Commodity	cmd
Alternative/specialty	alt
Barley	bar
Camelina	cam
Canola	can
Chickpeas/garbanzo	grb
Fruit	frt
GMOs/genetically engineered crops/transgenic crops	gmo

Grain	grn
Hay/forage	hay
Lentils	len
Peas	Pea
Nutritive value	nut
Pulse	pls
Oilseed	oil
Safflower	saf
Locally grown/Montana grown	mtg
Seeds	seed
Vegetables	veg
Wheat	wht
Pasture	pst

Production, preparation and costs	ppc
Crop rotations	cr
Transportation/shipping	trns
Processing	proc
Crop Diversity	cdvt
Overhead	ohd
Inputs	ipts
Social	soc
Education	edu
Promotion and Advertising	adv
Collaboration (e.g., unions and cooperatives)	coll

sustainability	sust
Geography	geo
Climate change	clch
Hub location	hub
Market location	mkt
Other	other
None needed	none

Question: What are your experiences with no-till?

Domains and subdomains	**Codes**
Duration: (write none or yes along with duration if given, or want-	dur
0/no	none

1-5	short
6-10	mod
11 or more	long
Yes	yes
Not truly no till. 'limited till/minimum till	ltil
No, but want to try	want
Experience	exp
Positive	pos
Good but depends	dep
Negative	neg
Temporal dependence (e.g., if it becomes easier through time to manage no-till acreage)	temp
Not feasible	nofe

Abiotic	abio
Improved soil (unspecified)	soil
Soil moisture	mois
Erosion	eros
Alters soil chemistry (pH, nutrients, CEC, example-N immobilization)	chem
Soil texture	text
Climate	clim
Economics	ec
Time	tim
Costs (e.g., requires more fertilizer thus higher input costs)	cost
Changes yield	yld

Equipment constraints	equip
Pest management	pest
Community (changes in the relative abundance of species e.g., more *Cirsium* less *Bromus*)	comm
Insect pressure	inse
Disease pressure	dise
Weed pressure (dominance of weeds)	weed
Annual weeds	annu
Perennial weeds	pere
Canada thistle	ciar
Cheatgrass	brte
Wild oat	avfa
Narrowleaf hawksbeard	crte

Evolved pesticide resistance	evol
Management	man
Seasonality (eg requires later planting)	seas
Crop residue	resi
Herbicide	herb
Fertilizer	fert
Fungicide	fung
Dryland	dry
Irrigation	irr
Organic products (or lack thereof)	org
Large acreage/size concerns	size

Social	soc
More to learn/need more educational outreach	edu

Question: What research do you feel would be the most beneficial to your operation?

Domains and subdomains	**Codes**
Specific pest	pst
Lepidoptera noctuidae (cutworm, armyworm, lantern moth)	leno
Wireworm	wire
Orange midge	om
Wheat midge	whmd
Wheat stem sawfly	saw
Pest	pst
Nematode	nem
Insect pest	pest

Perennial weeds	pern
Weeds	weed
Noxious weeds (those that are state listed)	nox
Russian thistle (*Salsola kali*)	rus
Narrowleaf hawksbeard (*Crepis tectorum*)	nlh
Wild oat (*Avena fatua*)	woat
Kochia (*Kochia scoparia*)	kosc
Spotted knapweed (*Centaurea stoebe*)	cest
Pigeon grass/green foxtail (*Setaria viridis*)	sevi
Pathogens	path
Pesticide resistance (weeds, insects, fungi etc.)	rest
Wheat curl mite	wcm
Cheatgrass, downy brome (*Bromus tectorum*)	brte

Canada/creeping thistle (*Cirsium arvense*)	ciar
Jointed goat grass (*Aegilops cylindrica*)	aecy
Field pennycress/fanweed (*Thlaspi arvense*)	thar
Quackgrass (*Elymus repens*)	elre
Field bindweed/morning glory/creeping jenny (*Convulvulus arvensis*)	coav
Beneficial associated biodiversity (biocontrol, pollinators, mycorrhizae)	ben
Pollinators	pol
Carabid beetles	beet
Natural enemies (i.e., predators and parasitoids)	par
Ecosystem services	ecos
Classical biocontrol agents	bioc

Abiotic environment	aben
Soil tilth (soil health)	tilt
Leaching/pollution	leach
Climatic factors	clim
Watershed	wshd
Erosion	ers
Spatial heterogeneity	sph
Plant biology and ecophysiology	phy
N use efficiency	nuse
Crop performance	crp
Nutritive values	ntrt
Water balance (water use efficiency, water potential)	wat

Allelopathy/chemical ecology	alp
Biological nitrogen fixation	fix
Phenology	phen
Inputs	inpt
Fungicide foliar	funf
Fungicide seed	funs
Herbicide	her
Chem fallow	chfa
Growth stimulators	grst
Non-fertilizer soil amendments (including composts)	nof
Input reduction	red
Miscellaneous/unspecified inputs	inpu

Fertilizers	fert
Residue	resi
Agronomy	agro
Livestock	liv
Cover crops	cov
Crop rotation	rot
Intercropping	inter
Fallowing	fall
Converting to organic	org
Tillage	til
Season extension (e.g., hoop houses, greenhouse, etc.)	sext
No till/reduced till	ntil

Seed bed prep	sbp
Integrated pest management	ipm
Irrigation	irr
Management system/cropping systems	mgt
Yields/net return	yld
Crop residue management	crm
Timing of application (including thresholds)	tim
Precision Agriculture	prag
Remote imagery	rim
GPS and mapping	gps
Application equipment	app

Specialty	spc
Alternative crops	alt
Asparagus	asp
Cabbage	cab
Fruit tree	fru
Micros	mic
Onions	oni
Pepper	pep
Quinoa	qui
GMO	gmo
Squash	squ
Tomato	tom
Vegetable/horticultural	veg

Potatoes (alternative for grower's location)	pot
Sugarbeets	bevu
Varieties	var
Miscellaneous roots and tubers	root
Lamb	lmb
Forage	frg
Unspecified forage	ufrg
Alfalfa	alf
Annual forage	afor
Forage kochia (*Bassia prostrata*)	fkoc
Timothy	phpl
Feed/hay barley	fbar

Grain	grn
Cereals	crl
Rye	rye
Wheat	wht
Varieties	var
Pulse (legumes)	pls
Pulse (generic and unspecified)	pulg
Soy	soy
Chickpea	chic
Mung beans	mun
Clover and sweetclover (*Trifolium* and *Melilotus*)	clv
Lentils	lecu

Peas	pea
Oilseed crops	oil
Mustard	mus
Flax	flax
Safflower	saf
Sunflower (*Helianthus annuus*)	hean
Unspecified	unsp
Marketing and Economics	mkt
Revenue streams/specific markets	rv
Geography	geo
Social/advertisement	soc

Production, preparation & cost	prd

Question: Where do you get your farming information?

Domains and subdomains	**Codes**
Personal communication	prc
Neighbors/fellow farmers/colleagues	nei
Coffee shops	cof
Consultants	Con
Suppliers (big ag, chem companies)	Sup
Family	Fam
Trial and error/personal experience	Tae
Media	Med
Journals (assuming peer reviewed)	jou

Internet (unspecific)	web
Periodicals (magazines, newspapers)	per
TV/radio	tvr
Miscellaneous publications	misc
Extension/University	eu
Electronic alerts	aga
Technical Bulletins	mtg
Agents	age
Demonstrations including field days, tours	demo
Workshops	wsh
General extension material/support	ext
Faculty	fac

Research station	sta
Agency/trade groups (NRCS, MWBC, ARS, APHIS, Soil and water con groups)	agcy
Miscellaneous meetings/workshops	agmis
Agency publications	agpub

Question: Please describe any on-farm research you are conducting?

Domains and subdomains	**Codes**
Specific pest	pst
Orange midge	om
Wheat midge	whmd
Wheat stem sawfly	saw
Pest	pst
Nematode	nem

Insect pest	pest
Weeds	weed
Noxious weeds (those that are state listed)	nox
Russian thistle	rus
Narrowleaf hawksbeard	nlh
Wild oat	woat
Kochia (*Kochia scoparia*)	kosc
Spotted knapweed (*Centaurea stoebe*)	cest
Pigeon grass/green foxtail (*Setaria viridis*)	sevi
Pathogens	path
Beneficial associated biodiversity (biocontrol, pollinators, mycorrhizae)	ben
Pollinators	pol

Carabid beetles	beet
Natural enemies (i.e., predators and parasitoids)	par
Classical biocontrol agents	bioc
Abiotic environment	aben
Soil tilth (soil health)	tilt
N leaching	leach
Climatic factors	clim
Watershed	wshd
Plant biology and ecophysiology	phy
N use efficiency	nuse
Crop performance	crp

Nutritive values	ntrt
Inputs	inpt
Fungicide foliar	funf
Fungicide seed	funs
Herbicide	her
Chem fallow	chfa
Growth stimulators	grst
Non-fertilizer soil ammendments (including composts)	nof
Fertilizers	fert
Agronomy	agro
Livestock	liv

Cover crops	cov
Crop rotation	rot
Intercropping	inter
Fallowing	fall
Converting to organic	org
Tillage	til
season extension (e.g., hoop houses, greenhouse, etc.)	sext
No till/reduced till	ntil
Seed bed prep	sbp
Integrated pest management	ipm
Irrigation	irr
Management system/cropping systems	mgt
Yields/net return	yld

Precision Agriculture	prag
Remote imagery	rim
GPS and mapping	gps
Application equipment	app
Specialty	spc
Alternative crops	alt
Asparagus	asp
Cabbage	cab
Fruit tree	fru
Micros	mic
Onions	oni

Pepper	pep
Quinoa	qui
GMO	gmo
Squash	squ
Tomato	tom
Vegetable/horticultural	veg
Potatoes (alternative for grower's location)	pot
Sugarbeets	bevu
Varieties	var
Forage	frg
Alfalfa	alf
Annual forage	afor

Forage kochia (*Bassia prostrata*)	fkoc
Timothy (*Phleum pratense*)	tim
Grain	grn
Barley	bar
Herbicide resistant	hbre
Cereals	crl
Wheat	wht
Pulse and legumes	pls
Pulse (generic and unspecified)	pulg
Soy	soy
Chickpea	chic

Mung beans	mun
Peas	pea
Oilseed crops	oil
Mustard	mus
Flax	flax