

HORTICULTURAL REPORT

2020 WEED CONTROL RESEARCH ON FRUIT & VEGETABLE CROPS

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By

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**WEED CONTROL IN HORTICULTURAL CROPS - 2020
FOREWORD**

This report summarizes the results of weed control experiments on horticultural crops in Michigan in 2020. It is intended to inform industry and university research and extension colleagues of our current results.

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METHODS

Chemical Application

Herbicides were applied with a small plot sprayer using carbon dioxide as a source of pressure. Spray volumes are specified in each experiment. All herbicide rates are expressed as pounds of active ingredient per acre.

Visual Evaluations

In most instances, weed control ratings were made on individual weed species. General ratings for broad-leaved weeds and grasses were sometimes used in orchard studies or for late-season assessments.

Weed control and crop injury are rated on a 1 to 10 scale; 1 = no visible injury or reduction in growth; 10 = complete kill of plants. The ratings can be roughly translated into percentages as follows:

10 = 100% kill, all the plants are dead or none are visible.

9 = 90-100% kill or reduction in growth and stand.

8 = 80-90% kill or reduction in growth and stand.

7 = 70-80% kill or reduction in growth and stand.

This is still a commercially acceptable control.

6 = 60-70% kill or reduction in growth and stand.

5 = 50% kill or reduction in growth and stand.

4 = 30-40% kill or reduction in growth and stand.

3 = 20-30% reduction in growth and stand.

2 = 10-20% reduction in growth and stand.

1 = 0-10% reduction in growth, no obvious effect of herbicide.

Experimental Design and Statistical Analysis

Experiments were set up and analyzed in the program Agriculture Research Manager (ARM) version 9.2014.7, from Gylling Data Management, Inc. (RR 4 405 Martin Boulevard, Brookings, SD 57006). Unless otherwise specified, the experiments were laid out as randomized complete blocks. The data were subjected to analysis of variance and the means were compared with the LSD test at the 5% level. Since data transformations were not used, the coefficient of variation for skewed ratings or weed densities may be misleading. In some instances, yields for weeded check plots may be low because of severe early weed competition. In these cases, it may be more desirable to compare new herbicides with standard treatments.

WEED LIST

Abbreviations for the common names of weeds correspond to those presented in the NCWSS proceedings volume 28 (1973), 143.

<u>Abbr.</u>	<u>Common Name</u>	<u>Botanical Name</u>
ALFA	alfalfa	<i>Medicago sativa</i> L.
ANBG	annual bluegrass	<i>Poa annua</i> L.
ANFB	annual fleabane	<i>Erigeron annuus</i> (L.) Pers.
ATRI	Atriplex	<i>Atriplex patula</i> L. (Gray)
ASDF	asiatic dayflower	<i>Commelina communis</i> L.
BABR	bald brome (upright brome)	<i>Bromus racemosus</i> L.
BEGR	Bermudagrass	<i>Cynodon dactylon</i> L. Pers.
BFTF	birdsfoot trefoil	<i>Lotus corniculatus</i> L.
BHPL	buckhorn plantain	<i>Plantago lanceolata</i> L.
BLCA	bladder campion	<i>Silene vulgaris</i> Pior.
BLDO	broadleaf dock	<i>Rumex obtusifolius</i> L.
BLME	black medic	<i>Medicago lupulina</i> L.
BRFB	British fleabane	<i>Inula britannica</i> L.
BRPL	broadleaf plantain	<i>Plantago major</i> L.
BSPL	blackseed plantain	<i>Plantago rugelii</i> Dcne.
BYGR	barnyardgrass	<i>Echinochloa crus-galli</i> (L.) Beauv.
CABG	Canada bluegrass	<i>Poa compressa</i> L.
CABR	California brome	<i>Bromus carinatus</i> L.
CAGE	Carolina geranium	<i>Geranium carolinianum</i> L.
CATH	Canada thistle	<i>Cirsium arvense</i> (L.) Scop.
CAWE	carpetweed	<i>Mollugo verticillata</i> L.
CEPR	common evening primrose	<i>Oenothera biennis</i> L.
CLGC	clammy groundcherry	<i>Physalis heterophylla</i> Nees.
COBD	common burdock	<i>Arctium minus</i> (Hill) Bernh.
COBU	cocklebur	<i>Xanthium strumarium</i> L.
COCW	common chickweed	<i>Stellaria media</i> (L.) Cyrillo
COGR	common groundsel	<i>Senecio vulgaris</i> L.
COLQ	common lambsquarters	<i>Chenopodium album</i> L.
COMA	common mallow	<i>Malva neglecta</i> Wallr.
COMU	common mullein	<i>Verbascum Thapsus</i> L.
COMW	common milkweed	<i>Asclepias syriaca</i> L.
COPU	common purslane	<i>Portulaca oleracea</i> L.
COPW	common pokeweed	<i>Phytolacca americana</i> L.
CORW	common ragweed	<i>Ambrosia artemisiifolia</i> L.
CRWS	creeping woodsorrel	<i>Oxalis corniculata</i> L.
CUDO	curly dock	<i>Rumex crispus</i> L.
CWBS	catchweed bedstraw	<i>Galium aparine</i> L.
DAND	dandelion	<i>Taraxacum officinale</i> Weber
DOBG	downy brome	<i>Bromus tectorum</i> L.
EBNS	eastern black nightshade	<i>Solanum ptycanthum</i> Dun.
FAPA	fall panicum	<i>Panicum dichotomiflorum</i> Michx.
FIBW	field bindweed	<i>Convolvulus arvensis</i> L.
FIPA	field pansy	<i>Viola rafinesquii</i> Greene
FIPC	field pennycress	<i>Thlaspi arvense</i> L.
FISB	field sandbur	<i>Cenchrus incertus</i> M.A.Curtis
FIVI	field violet	<i>Viola arvensis</i> Murray
FLWE	flixweed	<i>Descurainia sophia</i>
GALI	galinsoga, hairy	<i>Galinsoga ciliata</i> (Raf.) Blake

WEED LIST

<u>Abbr.</u>	<u>Common Name</u>	<u>Botanical Name</u>
GIRW	giant ragweed	<i>Ambrosia trifida</i> L.
GAGR	goosegrass	<i>Eleusine indica</i> (L.) Gaertn.
GORO	goldenrod	<i>Solidago nemoralis</i> Ait.
GIFT	giant foxtail	<i>Setaria faberi</i> Hermm.
GRFT	green foxtail	<i>Setaria viridis</i> (L.) Beauv.
GFPW	greenflower pepperweed	<i>Lepidium densiflorum</i> Schmd.
HABC	hairy bittercress	<i>Cardamine hirsute</i> L.
HAFE	hard fescue	<i>Festuca brevipila</i> Tracey
HANS	hairy nightshade	<i>Solanum sarrachoides</i> Sendtner
HAVE	hairy vetch	<i>Vicia villosa</i> Roth
HEBW	hedge bindweed	<i>Calystegia sepium</i> (L.) R. Br.
HENB	henbit	<i>Lamium amplexicaule</i> L.
HEMU	hedge mustard	<i>Sisymbrium officinale</i> (L.) Scop.
HOAL	hoary alyssum	<i>Berteroa incana</i> (L.) DC.
HONE	horsenettle	<i>Solanum carolinense</i> L.
HOWE	horseweed (marestail)	<i>Conyza canadensis</i> (L.) Scop.
IRFB	Irish fleabane	<i>Inula salicina</i> L.
JABR	Japanese brome	<i>Bromus japonicas</i> L.
JIWE	jimsonweed	<i>Datura stramonium</i> L.
LACG	large crabgrass	<i>Digitaria sanguinalis</i> (L.) Scop
LATH	ladysthumb	<i>Polygonum persicaria</i> L.
MAYC	marsh yellowcress	<i>Rorippa islandica</i> (Oeder) Barbs
MECW	mouseear chickweed	<i>Cerastium vulgatum</i> L.
MECR	mouseear cress	<i>Arabidopsis thaliana</i> (L.) Heynh
MONO	monolepis	<i>Monolepis nuttaliana</i> Greene
MUTH	musk thistle	<i>Carduus nutans</i> L.
MWCH	mayweed chamomile	<i>Anthemis cotula</i> L.
NIMB	nimblewill	<i>Muhlenbergia schreberi</i> J.F. Gmel.
NLLQ	narrowleaf lambsquarters	<i>Chenopodium desiccatum</i> A. Nels
OEDA	oxeye daisy	<i>Chrysanthemum leucanthemum</i> L.
ORGR	orchardgrass	<i>Dactylis glomerata</i> L.
PAAS	Panicled aster	<i>Symphotrichum lanceolatum</i> (Wild.) G.L. Nesom
PAWE	pineappleweed	<i>Matricaria matricarioides</i> (Less) C.L. Porter
PEST	perennial sowthistle	<i>Sonchus arvensis</i> L.
PESW	Pennsylvania smartweed	<i>Polygonum pennsylvanicum</i> L.
PERG	perennial ryegrass	<i>Lolium perenne</i> L.
POAM	Powell amaranth	<i>Amaranthus powellii</i> S. Wats
POIV	poison ivy	<i>Rhus radicans</i> L.
PRKW	prostrate knotweed	<i>Polygonum aviculare</i> L.
PRLE	prickly lettuce	<i>Lactuca serriola</i> L.
PRPW	prostrate pigweed	<i>Amaranthus blitoides</i> S. Wats.
PUDN	purple deadnettle	<i>Lamium purpureum</i> L.
PUSW	purslane speedwell	<i>Veronica serpyllifolia</i> L.
PUVI	puncturevine	<i>Tribulus terrestris</i> L.
QUGR	quackgrass	<i>Agropyron repens</i> (L.) Beauv.
RECL	red clover	<i>Trifolium pratense</i> L.
REFE	red fescue	<i>Festuca rubra</i> L.
RESO	red sorrel	<i>Rumex acetosella</i> L.
RFCL	rabbitfoot clover	<i>Trifolium arvenso</i> L.
ROCI	rough cinquefoil	<i>Potentilla norvegica</i> L.
ROFB	rough fleabane	<i>Erigeron asper</i> Nutt.
RRPW	redroot pigweed	<i>Amaranthus retroflexus</i> L.

WEED LIST

<u>Abbr.</u>	<u>Common Name</u>	<u>Botanical Name</u>
RSFI	redstem filaree	<i>Erodium cicutarium</i> (L.) L'Hér. ex Ait.
RUTH	Russian thistle	<i>Salsola iberica</i> L.
SFGE	smallflower geranium	<i>Geranium pusillum</i> L.
SHPU	shepherdspurse	<i>Capsella bursa-pastoris</i> (L.) Medic.
SLSW	slender speedwell	<i>Veronica filiformis</i> Sm.
SMGC	smooth groundcherry	<i>Physalis subglabrata</i> Mackenzit Bush
SPKW	spotted knapweed	<i>Centaurea stoebe</i> L.
SPSP	spotted spurge	<i>Euphorbia maculata</i> L.
STGR	stinkgrass	<i>Eragrostis cilianensis</i> (All.) E. Mosher
SWSW	swamp smartweed	<i>Polygonum coccineum</i> Muhl. ex Willd.
TAFE	tall fescue	<i>Festuca arundinacea</i> Schreb.
TLSW	thymeleaf sandwort	<i>Arenaria serpyllifolia</i> L.
TRCV	trailing crownvetch	<i>Coronilla caria</i> L.
TUPW	tumble pigweed	<i>Amaranthus albus</i> L.
VELE	velvetleaf	<i>Abutilon theophrasti</i> Medic.
VICR	Virginia creeper	<i>Parthenocissus quinquefolia</i> (L.) Planch.
VIPW	Virginia pepperweed	<i>Lepidium virginicum</i> L.
VOAS	volunteer asparagus	<i>Asparagus officinalis</i> L.
WESA	western salsify	<i>Tragopogon dubius</i> Scop.
WHCA	white campion	<i>Silene latifolia</i> Poir.
WHCL	white clover	<i>Trifolium repens</i> L.
WHHA	white heath aster	<i>Symphotrichum ericoides</i> L.
WIBW	wild buckwheat	<i>Polygonum convolvulus</i> L.
WICA	wild carrot	<i>Daucus carota</i> L.
WICH	wild chamomile	<i>Matricaria chamomilla</i> L.
WIGA	wild garlic	<i>Allium vineale</i> L.
WIGR	witchgrass	<i>Panicum capillare</i> L.
WIMU	wild mustard	<i>Sinapis arvensis</i> L.
WIRA	wild radish	<i>Raphanus raphanistrum</i> L.
WLDGRP	wild grape	<i>Vitis</i> sp.
WLDRASP	wild raspberry	<i>Rubus</i> sp.
YEFC	yellow fieldcress (kiek)	<i>Rorippa sylvestris</i> L.
YEFT	yellow foxtail	<i>Setaria glauca</i> (L.) Beauv.
YEHW	yellow hawkweed	<i>Hieracium caespitosum</i> Dumort.
YENS	yellow nutsedge	<i>Cyperus esculentus</i> L.
YERO	yellow rocket	<i>Barbarea vulgaris</i> R. Br.

CHEMICAL LIST

<u>COMMON NAME</u>	<u>TRADE NAME</u>	<u>FORMULATION</u>	<u>MANUFACTURER</u>
2,4-D amine	Weedar 64	3.8 L	Nufarm
2,4-D choline salt	Embed, GF3335	3.8 L	Corteva
acetochlor	Breakfree	6.4 EC	DuPont
acetochlor	Harness	7.0 E	Bayer Cropscience
acetochlor	Surpass	6.4 E	Corteva
acetochlor	Warrant	3 EC	Bayer Cropscience
acifluorfen	Ultra Blazer	2 L	UPL
ammonium soap of fatty acid	Finalsan	22.1% L	Neudorff
atrazine	AAtrex	4 L	Syngenta
atrazine 4.006 lb ai + pyroxasulfone 0.485 lb ai + fluthiacet-methyl 0.014 lb ai	Anthem ATZ	4.5 SE	FMC
bensulide	Prefar	4 EC	Gowan
bentazon	Basagran	4 L	UPLNA
bicyclopyrone	A 16003E	1.67 SL	Syngenta
bicyclopyrone 0.06 lb ai + mesotrione 0.24 lb ai + S-metolachlor 2.14 lb ai + atrazine 1 lb ai + benoxacor 0.107 lb ai	Acuron	3.547 CS	Syngenta
bromoxynil	Moxy	2 EC	Winfield Solutions
carfentrazone	Aim	2 EC	FMC
chlorimuron-ethyl	Classic	25 WDG	Corteva
clethodim	Intensity One	0.97 EC	Loveland
clethodim	Select Max	0.97 EC	Valent
clethodim	WE1557	2 EC	Wilbur Ellis
clomazone	Command	3 ME	FMC
clopyralid	Spur	3 EC	Albaugh
clopyralid	Stinger	3 EC	Corteva
cloransulam-methyl	Firstrate	84 WDG	Corteva
cycloate	Ro-Neet	6 EC	Helm Agro
DCPA	Dacthal	75 WP	AMVAC
dicamba	Clarity	4 L	BASF
diclobenil	Casoron G	4 G	UPL
diclobenil	Casoron L	1.4 CS	UPL
diflufenzopyr 21.4% + dicamba 55%	Distinct	76.4 WG	BASF
dimethenamid-P	Outlook	6 EC	BASF
dimethenamid-P	Tower	6 EC	BASF
diquat	Reglone	2 EC	Syngenta
diuron	Karmex	80 DF	Adama
EPTC	Eptam	7 EC	Gowan
ethalfluralin	Curbit	3 EC	Loveland
ethalfluralin 1.6 lb ai + clomazone 0.5 lb ai	Strategy	2.1 EC	Loveland
ethofumesate	Nortron SC	4 SC	Bayer CropScience
FeHEDTA	Fiesta	4.43% L	Neudorff
flazasulfuron	Mission	25 WG	ISK Bioscience
fluzafop-P	Fusilade DX	2 EC	Syngenta
flucarbazone	Everest	70 WDG	UPL
flufenacet 54.5% + metribuzin 13.6 %	Axiom	68 DF	Bayer CropScience
flumetsulam	Python	80 WDG	Corteva
flumioxazin	Chateau SW	51 WG	Valent

CHEMICAL LIST

<u>COMMON NAME</u>	<u>TRADE NAME</u>	<u>FORMULATION</u>	<u>MANUFACTURER</u>
flumioxazin	Sureguard	51 WDG	Valent
fluthiacet	Cadet	0.91 EC	FMC
fluthiacet + mesotrione	Solstice	4L	FMC
fluroxypyr	Starane Ultra	2.8 L	Corteva
fomesafen	Reflex	2 EC	Syngenta
fomesafen 10.2% + S-metolachlor 46.4%	Prefix	5.29 L	Syngenta
glufosinate	Rely 280, Liberty 280	2.34 L	BASF
glufosinate-ammonium	Lifeline	2.34 L	UPL
glufosinate-ammonium	Reckon 280	2.34 L	Solera
glyphosate	Durango	5.4 L	Corteva
glyphosate	Roundup PowerMax	5.5 L	Bayer Cropscience
glyphosate	Roundup Ultra	4 L	Bayer Cropscience
glyphosate	Roundup UltraMax	5 L	Bayer Cropscience
glyphosate	Roundup WeatherMax	5.5 L	Bayer Cropscience
glyphosate	Touchdown Total	4.17 L	Syngenta
halosulfuron	Permit	75 WG	Gowan
halosulfuron	Sandea	75 WG	Gowan
hexazinone	Velpar	2 L	TKI Novasource
hexazinone	Velpar ULV	75 SG	TKI Novasource
hexazinone + sulfometuron	Westar	75 WDG	Bayer Cropscience
imazamox	Raptor	1 AS	BASF
imazapic	Plateau	70 WG	BASF
imazethapyr	Pursuit	2 EC	BASF
imazosulfuron	League	75 WDG	Valent
indaziflam	Alion 200	1.67 SC	Bayer CropScience
indaziflam	Alion 500	4.17 SC	Bayer CropScience
isoxaben	Trellis	4.16 SC	Corteva
linuron	Lorox	50 DF	TKI NovaSource
mesotrione	Callisto	4 SC	Syngenta
metribuzin	Tricor	75 DF	UPL
napropamide	Devrinol DF-XT	50 DF	UPL
nicosulfuron	Accent	75 WDG	Corteva
nicosulfuron + mesotrione + isoxadifen-ethyl	Revulin Q	51.2 WDG	Corteva
norflurazon	Solicam	80 DF	TKI NovaSource
oryzalin	Surflan	4 AS	UPL
oxyfluorfen	Goal 2XL	2 EC	Nufarm
oxyfluorfen	GoalTender	4 SC	Nufarm
paraquat	Gramoxone SL	2 L	Syngenta
pelargonic acid	Scythe	4.2 EC	Gowan
pendimethalin	Prowl	3.3 EC	BASF
pendimethalin	Prowl H2O	3.8 ACS	BASF
pendimethalin	Satellite Hydrocap	3.8 SC	UPLNA
penoxsulam 0.083 lb ai + oxyfluorfen 3.93 lb ai	Pindar GT	4.013	Corteva
phenmedipham	Spin-Aid	1.3 L	Bayer CropScience

CHEMICAL LIST

<u>COMMON NAME</u>	<u>TRADE NAME</u>	<u>FORMULATION</u>	<u>MANUFACTURER</u>
phenmedipham 0.6 lb ai + desmedipham 0.6 lb ai	Betamix	1.3 L	Bayer CropScience
prometryn	Caparol	4 L	Syngenta
pronamide	Kerb	3.3 SC	Corteva
pyraflufen-ethyl	Venue	0.17 SC	Nichino
pyroxasulfone	Zidua	85 WDG	BASF
pyroxasulfone 2.087 lb ai + fluthiacet-methyl 0.063 lb ai	Anthem	2.15 SE	FMC
pyroxasulfone 4.174 lb ai + fluthiacet-methyl 0.126 lb ai	Anthem MAXX	4.30 SC	FMC
quinclorac	Quinstar	3.8 L	Albaugh
quizalofop-P-ethyl	Assure II	0.88 EC	Corteva
quizalofop-P-ethyl	Targa	0.88 EC	Gowan
rimsulfuron	Matrix	25 DF	Corteva
rimsulfuron	Solida	25 DF	FMC
saflufenacil	Sharpen	2.85 SC	BASF
saflufenacil	Treevix	70 WG	BASF
sethoxydim	Poast	1.53 EC	BASF
simazine	Princep	90 DF	Syngenta
S-metolachlor	Cinch	7.64 EC	Corteva
S-metolachlor	Dual Magnum	7.62 EC	Syngenta
S-metolachlor 3.34 lb ai + mesotrione 0.33 lb ai	Camix	3.67 L	Syngenta
S-metolachlor 2.68 lb ai + mesotrione 0.268 lb ai + atrazine 1.0 lb ai	Lumax	3.948 L	Syngenta
S-metolachlor II	Dual II Magnum	7.64 EC	Syngenta
sodium soap of asulam	Asulox	3.34 L	UPL
sulfentrazone	Spartan, Zeus	4 F	FMC
Sulfentrazone	Shutdown	4.16 SC	UPL
sulfentrazone + metribuzin	F4242	4 L	FMC
sulfentrazone 3.15 lb ai + carfentrazone 0.35 lb ai	Spartan Charge, Zeus Prime XC	3.5 SE	FMC
sulfentrazone 0.18 lb ai + metribuzin 0.27 lb ai	Authority MTZ	45 DF	FMC
sulfometuron	Oust XP	75 WDG	Bayer CropScience
tembotrione	Laudis	3.5 SC	Bayer CropScience
terbacil	Sinbar	80 WDG	TKI NovaSource
tolpyralate	Shieldex 400 SC	3.33 L	Summit Agro USA
topramezone	Impact	2.8 L	Amvac
triclopyr	Garlon	3 SC	Corteva
trifloxysulfuron	Envoke	75 WG	Syngenta
trifluralin	Treflan	4 EC	Helena
triflusulfuron	Upbeet	50 WDG	Corteva

ADJUVANTS

<u>TRADE NAME</u>	<u>ABBREVIATION</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER</u>
Activator 90	NIS	nonionic surfactant	Loveland
Agri-dex	COC	heavy range paraffinic oil	Helena
ammonium nitrate	AN	100% salt	
ammonium sulfate	AMS	spray grade fertilizer	
copper sulfate		100% salt	
Freeway		organosilicone surfactant	Loveland
Herbimax	COC	80% paraffin base + petroleum oil + 20% surfactant	Loveland
LI6193-11	COC		Loveland
MSO		methylated seed oil	Helena
28% Nitrogen	UAN	28% urea ammonium nitrate solution	
N-Pak	AMS	34% ammonium sulfate liquid	Winfield Solution
Preference	NIS	90% fatty acid	Winfield
Silwet L-77		organosilicone surfactant	Loveland
Sylgard 309		organosilicone surfactant	Dow Corning

ABBREVIATIONS USED IN THE REPORT

A =	Acre	NO. =	Number
a.i. / ai =	Active Ingredient	NS =	Nicole Soldan
Amt =	Amount	OM =	Organic Matter
ACS =	Aqueous Capsule Suspension	OZ =	Ounce
AMS =	Ammonium Sulfate	P =	Probability
AS =	Aqueous Solution	POH =	Post Harvest
ASPA =	Asparagus	PO1 =	Postemergence 1
BIR =	Bicyclopyrone	PO2 =	Postemergence 2
BZ =	Bernard Zandstra	POST =	Postemergence
CEC =	Cation Exchange Capacity	POT =	Post Transplant
CRC =	Clarksville Research Center	PPI =	Preplant Incorporated
CS =	Capsule Suspension	PRE =	Preemergence
CV =	Coefficient of Variability	PREC. =	Precipitation (inches)
DF =	Dry Flowable	PRT =	Pretransplant
DIA =	Diameter	PSI =	Pounds per square inch
DIR =	Directed	PT PR =	Pint Product
DS =	Designator	QT =	Quart
EC =	Emulsifiable Concentrate	QT PR =	Quart Product
EPRE =	Early PRE	RCB / RCBD =	Randomized Complete Block Design
EPOS =	Early POST	RH =	Relative Humidity
F =	Flowable or Fahrenheit	REPS =	Replication
FALL =	Fall Application	SC =	Suspension Concentrate or Sushila Chaudhari
FORM =	Formulation	SE =	Suspoemulsion
FM =	Formulation	SNBE =	Snapbean
FT =	Distance in FT	SP =	Soluble Powder
g / gr =	Gram	SPRING =	Spring Application
GAL =	Gallon	STBE =	Strawberry
GPA =	Gallon per acre	SURF =	Surface
GROW STG =	Growth Stage at time of Application	SWMREC =	Southwest Michigan Research and Extension Center
HTRC =	Horticulture Teaching and Research Center	T =	Temperature
IN =	Inch	TNRC =	Trevor Nichols Research Complex
KG =	Kilogram	TRT =	Treatment
L =	Liquid	UNMKTBL =	Unmarketable
LPRE =	Late PRE	UNTRT. =	Untreated
LPOS =	Late POST	VEG =	Vegetative
LO =	Low Odor	WDG =	Water Dispersible Granule
LS =	Leaf Stage	WSG =	Water Soluble Granule
LSD =	Least Significant Difference	WP =	Wettable Powder
LB =	Pounds	WT =	Weight
ME =	Microencapsulated	' =	Feet
MKTBL =	Marketable	" =	Inches
MPH =	Mile(s) per hour	Y =	Yes
MSU =	Michigan State University		
N =	No		
NA =	Not Applicable/ Not Available		

TEMPERATURE AND PRECIPITATION DATA

MSU Horticulture Teaching and Research Center

Recorded at
MSU Horticulture Teaching and Research Center (HTRC)
East Lansing, Michigan
2020

APRIL				MAY				JUNE			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	48.6	38.1	0	1	64	38.8	0	1	72.3	39.4	0.09
2	59.4	34.5	0	2	75.5	50.1	0	2	88.3	56.4	0
3	61.8	32.1	0	3	70.6	48.6	0	3	82.2	61.4	0.02
4	51.8	39.4	0.03	4	57.5	36.2	0	4	85.1	54.1	0
5	54.5	32.8	0	5	51.8	38	0	5	87.2	54.8	0
6	61.9	28.8	0	6	60.5	31.7	0	6	79.8	57.8	0
7	71.7	42.3	0.79	7	62	32.3	0	7	74.9	49.6	0
8	66.6	45.6	0.15	8	42.6	30.1	0	8	83.8	52.9	0
9	48.5	31.5	0.03	9	51.8	24.7	0	9	90.6	55.7	0.01
10	41.4	30.7	0.01	10	56.4	35.9	0.36	10	89.3	65.2	0.8
11	56.8	27.5	0	11	45.6	29.1	0	11	75	57.6	0.09
12	60.5	43.2	0.04	12	57.9	28.5	0	12	69.6	51.3	0
13	56.3	32.1	0.03	13	62.6	27.1	0	13	65.9	45.4	0
14	37.2	28	0	14	64.6	43.7	0.86	14	69.1	38.1	0
15	35.7	23.1	0.05	15	71.1	58.4	0.85	15	75.7	40	0
16	40.3	21	0	16	69.5	49.2	0	16	81.2	49	0
17	36	26.8	0.1	17	57.8	51.2	0.38	17	82.3	52.8	0
18	53.4	28.9	0.01	18	61.2	54.1	1.44	18	86.4	51.7	0
19	59.2	34	0	19	64.9	55.2	0.04	19	88.9	58.1	0
20	58	29	0.07	20	68.2	49.5	0	20	90.3	60.1	0
21	46.9	26.1	0.05	21	72.7	49.7	0	21	84.2	66	0.55
22	36.6	21	0.03	22	69.3	56.6	0.03	22	84	62.9	0.11
23	43.5	32.4	0.47	23	75.2	56.4	0	23	71.5	59.6	0.14
24	53.8	37	0	24	86.2	62	0	24	75.2	56.4	0
25	54.3	32.5	0	25	87.9	60.6	0.01	25	79	54.6	0
26	60.6	37.6	0	26	89.6	62.5	0	26	82	52.7	0.94
27	62.5	28.1	0.06	27	85.4	62.4	0	27	84	65.2	0.15
28	69.7	41.9	0.02	28	77.1	67.4	0.03	28	84.4	58.5	0
29	64.4	52.9	0.58	29	71	57	0.33	29	85.9	60.6	0
30	54.9	43.9	0.35	30	67.3	51.1	0	30	85.8	61.5	0
				31	63.8	39.8	0				

TEMPERATURE AND PRECIPITATION DATA

MSU Horticulture Teaching and Research Center

Recorded at
MSU Horticulture Teaching and Research Center (HTRC)
East Lansing, Michigan
2020

JULY				AUGUST				SEPTEMBER			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	87	60.4	0	1	77.6	55.8	0	1	82.3	59.6	0.62
2	90.1	61.9	0	2	76.6	62.3	0.71	2	79.1	56.6	0.05
3	91.9	64.1	0	3	79.1	62.1	0	3	83.5	54.5	0
4	88.3	65.4	0	4	70	54.6	0.02	4	72.1	48.2	0
5	90.1	60.3	0	5	75.1	46.3	0	5	78.3	49	0
6	91.5	65.6	0	6	78.2	48.5	0	6	72.4	44.6	0.02
7	92.9	63.6	0	7	80.8	47.6	0	7	78.3	59.8	0.04
8	91.3	66.2	0.21	8	82.9	50.7	0	8	61.4	52.9	2.27
9	92.6	68.5	0	9	88.5	65.7	0	9	62.5	53.4	0.28
10	81.5	69.1	0.56	10	89.5	68.2	0.13	10	61.2	51.8	0.02
11	83.4	63.2	0	11	82.3	59.2	0	11	67.4	49.4	0
12	80	59	0	12	85.5	52.1	0	12	75.9	51.9	0.12
13	79.7	57.7	0	13	85.1	53.2	0	13	71.9	58.3	0.31
14	82.5	55	0	14	87.1	59.1	0	14	64.9	44.7	0
15	87.1	64.2	0	15	88.3	62.9	0	15	71.5	43.8	0
16	78.5	67.2	0.59	16	81.3	58.9	0	16	77.1	51.4	0
17	84.7	59	0	17	82.3	55.3	0	17	64.9	45.5	0
18	89.6	62	0	18	77.3	51.5	0	18	59.3	36.3	0
19	82.7	69.7	0.27	19	77.2	46.9	0	19	63.6	33	0
20	81.6	64.8	0	20	83.8	50.3	0	20	67.2	34.1	0
21	81.7	64.5	0	21	87.2	57.6	0	21	71.6	39	0
22	83.4	66.4	0	22	88.2	56.5	0	22	76.4	42	0
23	82.1	62.5	0	23	87.4	58.8	0	23	78.4	46.2	0
24	82.3	56	0	24	90.1	61.4	0	24	76.7	51.2	0
25	88.2	56.6	0	25	83	68.5	0	25	80	48.7	0
26	92	63.3	0	26	88.2	65.2	0.18	26	80.3	52.1	0
27	85.8	64.2	0	27	91.3	71.7	0	27	72.7	60.4	0
28	84.6	60	0	28	84.3	68.4	1.55	28	63.3	50.7	0.19
29	86.2	63.5	0.01	29	76.6	61.6	0.14	29	64.9	48.1	0
30	81.5	58	0	30	72.3	54.1	0	30	61.3	46	0.36
31	81.9	53	0	31	79.3	52.1	0				

TEMPERATURE AND PRECIPITATION DATA

MSU Southwest Michigan Research and Extension Center

Recorded at
MSU Southwest Michigan Research and Extension Center (Benton Harbor)
Benton Harbor, Michigan
2020

APRIL				MAY				JUNE			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	48.6	38.1	0	1	64	38.8	0	1	72.3	39.4	0.09
2	59.4	34.5	0	2	75.5	50.1	0	2	88.3	56.4	0
3	61.8	32.1	0	3	70.6	48.6	0	3	82.2	61.4	0.02
4	51.8	39.4	0.03	4	57.5	36.2	0	4	85.1	54.1	0
5	54.5	32.8	0	5	51.8	38	0	5	87.2	54.8	0
6	61.9	28.8	0	6	60.5	31.7	0	6	79.8	57.8	0
7	71.7	42.3	0.79	7	62	32.3	0	7	74.9	49.6	0
8	66.6	45.6	0.15	8	42.6	30.1	0	8	83.8	52.9	0
9	48.5	31.5	0.03	9	51.8	24.7	0	9	90.6	55.7	0.01
10	41.4	30.7	0.01	10	56.4	35.9	0.36	10	89.3	65.2	0.8
11	56.8	27.5	0	11	45.6	29.1	0	11	75	57.6	0.09
12	60.5	43.2	0.04	12	57.9	28.5	0	12	69.6	51.3	0
13	56.3	32.1	0.03	13	62.6	27.1	0	13	65.9	45.4	0
14	37.2	28	0	14	64.6	43.7	0.86	14	69.1	38.1	0
15	35.7	23.1	0.05	15	71.1	58.4	0.85	15	75.7	40	0
16	40.3	21	0	16	69.5	49.2	0	16	81.2	49	0
17	36	26.8	0.1	17	57.8	51.2	0.38	17	82.3	52.8	0
18	53.4	28.9	0.01	18	61.2	54.1	1.44	18	86.4	51.7	0
19	59.2	34	0	19	64.9	55.2	0.04	19	88.9	58.1	0
20	58	29	0.07	20	68.2	49.5	0	20	90.3	60.1	0
21	46.9	26.1	0.05	21	72.7	49.7	0	21	84.2	66	0.55
22	36.6	21	0.03	22	69.3	56.6	0.03	22	84	62.9	0.11
23	43.5	32.4	0.47	23	75.2	56.4	0	23	71.5	59.6	0.14
24	53.8	37	0	24	86.2	62	0	24	75.2	56.4	0
25	54.3	32.5	0	25	87.9	60.6	0.01	25	79	54.6	0
26	60.6	37.6	0	26	89.6	62.5	0	26	82	52.7	0.94
27	62.5	28.1	0.06	27	85.4	62.4	0	27	84	65.2	0.15
28	69.7	41.9	0.02	28	77.1	67.4	0.03	28	84.4	58.5	0
29	64.4	52.9	0.58	29	71	57	0.33	29	85.9	60.6	0
30	54.9	43.9	0.35	30	67.3	51.1	0	30	85.8	61.5	0
				31	63.8	39.8	0				

TEMPERATURE AND PRECIPITATION DATA

MSU Southwest Michigan Research and Extension Center

Recorded at
MSU Southwest Michigan Research and Extension Center (Benton Harbor)
Benton Harbor, Michigan
2020

JULY				AUGUST				SEPTEMBER			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	87	60.4	0	1	77.6	55.8	0	1	82.3	59.6	0.62
2	90.1	61.9	0	2	76.6	62.3	0.71	2	79.1	56.6	0.05
3	91.9	64.1	0	3	79.1	62.1	0	3	83.5	54.5	0
4	88.3	65.4	0	4	70	54.6	0.02	4	72.1	48.2	0
5	90.1	60.3	0	5	75.1	46.3	0	5	78.3	49	0
6	91.5	65.6	0	6	78.2	48.5	0	6	72.4	44.6	0.02
7	92.9	63.6	0	7	80.8	47.6	0	7	78.3	59.8	0.04
8	91.3	66.2	0.21	8	82.9	50.7	0	8	61.4	52.9	2.27
9	92.6	68.5	0	9	88.5	65.7	0	9	62.5	53.4	0.28
10	81.5	69.1	0.56	10	89.5	68.2	0.13	10	61.2	51.8	0.02
11	83.4	63.2	0	11	82.3	59.2	0	11	67.4	49.4	0
12	80	59	0	12	85.5	52.1	0	12	75.9	51.9	0.12
13	79.7	57.7	0	13	85.1	53.2	0	13	71.9	58.3	0.31
14	82.5	55	0	14	87.1	59.1	0	14	64.9	44.7	0
15	87.1	64.2	0	15	88.3	62.9	0	15	71.5	43.8	0
16	78.5	67.2	0.59	16	81.3	58.9	0	16	77.1	51.4	0
17	84.7	59	0	17	82.3	55.3	0	17	64.9	45.5	0
18	89.6	62	0	18	77.3	51.5	0	18	59.3	36.3	0
19	82.7	69.7	0.27	19	77.2	46.9	0	19	63.6	33	0
20	81.6	64.8	0	20	83.8	50.3	0	20	67.2	34.1	0
21	81.7	64.5	0	21	87.2	57.6	0	21	71.6	39	0
22	83.4	66.4	0	22	88.2	56.5	0	22	76.4	42	0
23	82.1	62.5	0	23	87.4	58.8	0	23	78.4	46.2	0
24	82.3	56	0	24	90.1	61.4	0	24	76.7	51.2	0
25	88.2	56.6	0	25	83	68.5	0	25	80	48.7	0
26	92	63.3	0	26	88.2	65.2	0.18	26	80.3	52.1	0
27	85.8	64.2	0	27	91.3	71.7	0	27	72.7	60.4	0
28	84.6	60	0	28	84.3	68.4	1.55	28	63.3	50.7	0.19
29	86.2	63.5	0.01	29	76.6	61.6	0.14	29	64.9	48.1	0
30	81.5	58	0	30	72.3	54.1	0	30	61.3	46	0.36
31	81.9	53	0	31	79.3	52.1	0				

TEMPERATURE AND PRECIPITATION DATA

Hudsonville

Recorded at
Michigan Celery Cooperative
Hudsonville, Michigan
2020

APRIL				MAY				JUNE			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	50.3	37	0	1	61.6	32.6	0	1	73.6	41.8	0
2	58.9	28.4	0	2	67.9	50.3	0	2	85.8	64.1	0
3	66	31.7	0	3	66.4	44.9	0	3	78.5	60.5	0.29
4	53.1	38.6	0.08	4	57.7	35.4	0	4	83.4	60.2	0
5	57.5	31.7	0	5	54.4	41.8	0	5	82.9	56.4	0
6	63.2	28.7	0	6	59.5	30.6	0	6	79.9	56.9	0
7	72.9	50.2	0.34	7	58	35.7	0	7	78	54.1	0
8	61.5	44.1	0.33	8	44.9	29	0	8	86.5	58.9	0
9	47.1	33.5	0.11	9	51.4	23.3	0	9	91.5	65.5	0.65
10	41.5	31.9	0.02	10	56.2	36	0.11	10	81.6	56.8	0.71
11	58.3	26.5	0.02	11	48.9	34	0	11	74.8	56.6	0.07
12	64.1	46.4	0.06	12	54.5	31.4	0	12	71.7	50.3	0
13	54.1	31.6	0.08	13	64.3	30.2	0	13	67.2	49.8	0
14	37	26.7	0.04	14	63.8	47	0.65	14	70.4	42.1	0
15	37.8	26.4	0.07	15	71.9	51	0.63	15	75.6	48.2	0
16	40.4	22.9	0.07	16	68.7	45.7	0	16	85.2	51.6	0
17	39.8	30.7	0.1	17	57.7	51.7	1.82	17	84.8	57.5	0
18	54	30.5	0	18	58.1	52.5	0.66	18	88.4	57.5	0
19	56.3	35.1	0	19	63.1	54.3	0.03	19	88.9	58.1	0
20	56.7	29.6	0.09	20	71.7	51.7	0	20	88.8	63.2	0
21	42.1	26.6	0	21	74.6	51.8	0	21	79.3	62.1	0
22	44.1	23.6	0.02	22	73	58	0	22	85.4	58	0.01
23	49.7	35.7	0.04	23	79	54.1	0	23	72	57.3	0.01
24	55.7	38.8	0	24	81.3	65	0	24	73.7	54.7	0
25	54.1	37.5	0.01	25	86.4	61.7	0	25	76.5	54.2	0
26	66.7	41.5	0	26	90	63.8	0	26	80.1	55.5	1.37
27	61.6	30.1	0.17	27	74.2	70.1	0	27	81.6	65.8	0
28	69.3	40.8	1.02	28	75.8	61.2	0.36	28	86.9	60.2	0
29	58.7	43	0.93	29	69.5	53.1	0.18	29	88.1	63.1	0
30	51.9	43	0.04	30	67	48.1	0	30	88.1	69.7	0
				31	63.7	40.9	0				

TEMPERATURE AND PRECIPITATION DATA

Hudsonville

Recorded at
Michigan Celery Cooperative
Hudsonville, Michigan
2020

JULY				AUGUST				SEPTEMBER			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	88.3	62	0	1	78.6	62.3	0	1	77.7	65.6	0.04
2	91.2	63.4	0	2	78.4	63.8	0.63	2	80.3	59.9	0.28
3	88.8	63.1	0	3	77.6	60.6	0	3	83.4	57.3	0
4	89.7	65.9	0	4	72.8	53.8	0.01	4	72.6	47.2	0
5	89.3	64.6	0	5	75.1	46.9	0	5	77.6	52.4	0
6	90.4	59.6	0	6	78.8	50.2	0	6	75.5	46.6	0.03
7	90.6	67.4	0	7	81.9	51.5	0	7	77.3	59.7	0
8	90.5	70.8	0	8	83.5	54.1	0	8	62.9	53.8	0.84
9	91.3	66.7	0	9	88.3	67.5	0	9	60.4	49.8	0.58
10	81	66.5	1.36	10	86.8	67.9	0.74	10	62.6	51.9	0.03
11	81.9	63.8	0	11	81.1	59.2	0	11	69.2	52.7	0
12	81.6	63.8	0	12	86.1	53.5	0	12	68.9	56.7	0.12
13	81.8	54.7	0	13	85	56.9	0	13	67.6	52.2	0.06
14	82.8	55	0	14	88.7	60.2	0	14	67.6	49	0
15	85.6	66	0.09	15	87.2	61.6	0	15	74.6	49.2	0
16	81.8	64.3	0.21	16	82.7	61.3	0	16	76.6	54.7	0
17	82.9	60.6	0	17	81.9	58.6	0.03	17	69	49.7	0
18	89.8	65.2	0	18	77.1	52.8	0	18	62.7	38.4	0
19	81.6	67.3	0.99	19	79.6	45.8	0	19	64.3	35.2	0
20	79.9	63.6	0	20	81.5	55.3	0	20	69.7	37.8	0
21	81.9	64.3	0	21	83.8	58	0	21	73.1	41.8	0
22	80.5	67.9	0	22	86.2	57.4	0	22	76.2	46.2	0
23	84.6	62.2	0	23	85.6	62.7	0	23	78.1	49.3	0
24	85.6	62.9	0	24	89.7	66	0	24	76.9	55.3	0
25	85.4	60.3	0	25	82.8	69.3	0	25	80.4	56.2	0
26	90	68.6	0.1	26	88.4	68.3	0	26	81.4	60.7	0
27	80.3	63.6	0	27	88.9	74.8	0	27	76.3	58.2	0.01
28	82.9	60.6	0	28	87.9	67.4	0.46	28	60.5	51.9	0.49
29	84.2	62.9	0.08	29	75.3	59.3	0.01	29	62	48.1	0.04
30	82.9	57.8	0	30	76.7	49.3	0	30	62.3	48.3	0.43
31	84.6	56.9	0	31	80.7	56.9	0				

TEMPERATURE AND PRECIPITATION DATA

Momence

Recorded at
 Stelle, Illinois Climate Network Station
 Stelle, Illinois
 2020

APRIL				MAY				JUNE			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	57.6	36.6	0	1	65.5	34.2	0	1	76.9	48.3	0
2	62.4	32.9	0	2	78.3	53.9	0.03	2	94.2	57.2	0
3	70.3	43.6	0	3	68.9	45.7	0	3	82.7	67.7	0.57
4	44.6	32.8	0.03	4	52	41.1	0	4	84.5	66.6	0
5	56.4	32.7	0	5	48.1	39.5	0.43	5	88.1	64.4	0
6	68	33.8	0	6	60.8	37.2	0	6	82.8	60.5	0
7	80.6	54.9	0	7	66.7	43.9	0	7	85.9	58.4	0
8	79.9	46	0.04	8	52.4	30.5	0.01	8	89.5	59.7	0
9	50.2	32.2	0	9	59.1	25.5	0	9	85.9	70.8	0.81
10	52.9	29.2	0	10	52.4	36.6	0.02	10	80	60.7	0.22
11	67.9	39.9	0.21	11	50.2	39.5	0	11	81.8	56.4	0
12	63.6	44.6	0.06	12	63	31.7	0	12	84.9	56.7	0
13	53.6	27	0.02	13	63.1	36.9	0	13	73.6	54.4	0.02
14	43.3	23.2	0	14	72.5	53.1	1.7	14	74.1	50.7	0
15	39.9	24.2	0.06	15	74.4	57.6	0.28	15	78.1	51.2	0
16	46.2	24.2	0.01	16	76.5	54.9	0.44	16	83.8	57.7	0
17	37.7	30.8	0.42	17	69.5	55.1	2.16	17	85.9	59.7	0
18	57	29	0	18	65.1	53.6	0.33	18	89.1	59.7	0
19	63.1	38.1	0	19	64.6	53.1	0.23	19	91.4	62.6	0
20	63.8	30.6	0	20	63.1	54.2	0	20	89.7	61.8	0.28
21	54.5	34.2	0	21	62.1	54	0	21	80.2	63.4	0.16
22	68.2	30	0	22	74	53.5	0	22	88	64.1	0.12
23	61	44.5	0.05	23	80	59.3	0.24	23	77.3	61	0
24	58.3	41.9	0.17	24	87.8	61.9	0.02	24	81.2	58.4	0
25	48.3	41.7	1.16	25	83.9	65.4	0.25	25	86.1	55.9	0.01
26	61.1	40.9	0.04	26	85.5	64.6	0	26	92.2	61.9	0.4
27	65.9	35	0	27	84.3	63.9	0	27	86.3	68.4	0.3
28	76.3	49.9	0.61	28	82.3	65.2	0.05	28	85.6	68	0
29	58.7	44.1	1.71	29	76.8	54	0.02	29	89.9	70.3	0
30	59.4	40.8	0.03	30	73.5	51.9	0	30	86.8	69.7	0.48
				31	72.9	49.7	0				

TEMPERATURE AND PRECIPITATION DATA

Momence

Recorded at
Stelle, Illinois Climate Network Station
Stelle, Illinois
2019

JULY				AUGUST				SEPTEMBER			
Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.	Date	High Temp F	Low Temp F	Total Prec. in.
1	87.2	67.8	0	1	73.2	63.5	0.26	1	74.8	63.8	0.35
2	87.7	67.6	0	2	81.8	61.4	0	2	80.2	60.8	0
3	90.1	65.2	0	3	72.4	57.1	0	3	86.9	57.3	0
4	89.8	64.1	0	4	72.7	50.4	0	4	78.2	46.2	0
5	91.4	67.3	0	5	76.4	47.2	0	5	85.9	52.7	0
6	93	66.2	0	6	78.7	51.7	0	6	78.6	55.2	1.12
7	93.7	68	0.2	7	80.5	53	0	7	80.2	60.9	0.03
8	93.5	67.9	0	8	84	57.1	0	8	71.9	59.4	1.54
9	91.6	67.6	0.13	9	85.8	63.6	0	9	76.5	60.9	0.08
10	84.9	67.2	0.07	10	91.4	63.3	0.29	10	71.7	58.3	0.02
11	86.5	63.5	0.54	11	82.7	61.2	0	11	74.8	59.3	0
12	80.5	61	0	12	82.7	55.6	0	12	72.5	60.4	0.53
13	83.5	56.1	0	13	84.6	64	0	13	76.8	54.5	0
14	83.9	58.2	0	14	86.7	59.7	0	14	74.9	53	0
15	82.6	64.4	2.62	15	87.6	60.9	0.14	15	77.1	52.3	0
16	83.2	65.7	0	16	82.5	59.7	0	16	81.3	48	0
17	84.8	59.9	0	17	84.3	59.5	0	17	73.2	51.7	0
18	88.4	69.7	0.02	18	79.9	54.8	0.01	18	63.7	42.3	0
19	83.1	67.6	0.64	19	80.1	52.4	0	19	67.8	40.6	0
20	85	66.6	0	20	81.3	50.8	0	20	72.7	44.9	0
21	80.1	68.3	0.2	21	83.7	52	0	21	76	43.4	0
22	83.3	64.6	0	22	83.8	54	0	22	78.5	46.6	0
23	79.4	62.2	0	23	88.2	57.3	0	23	75.8	50.3	0
24	83.3	59.3	0	24	93.4	64.2	0	24	78.6	49.4	0
25	85.5	59.2	0	25	91.3	70.9	0	25	79.7	48.2	0
26	90.4	66.8	0	26	90.2	67.1	0	26	80.6	57.8	0
27	84.4	62.4	0.04	27	90.9	69.8	0	27	81	52	0.12
28	84.4	59.7	0	28	88.8	67.7	0.32	28	65.5	42.2	0.25
29	86.7	62.9	0	29	79.6	53.9	0	29	59.8	39	0
30	76.1	65.9	0.21	30	78.4	51.3	0	30	66.8	43.3	0.01
31	79.9	63.1	0	31	82	55.7	0				

Weed Control in Basil - IR4 - Van Drunen - 2020

Project Code: 117-20-1

Location: Momence, IL

Personnel: S. Chaudhari, B. Zandstra, N. Soldan, M. Hemker, A. Paarlberg
 Crop: Basil Variety: Obsession, Plenty
 Planting Method: Seeded Planting Date: 6/9/20 Harvest Date: 8/5/20
 Spacing: 20 seeds/foot Row Spacing: 10"; 3 rows of each variety per plot
 Tillage Type: Conventional Study Design: RCB Replications: 3
 Plot Size: 6.6 ft wide x 30 ft long

Soil Type: Jasper Loam OM: 6% pH: 6.8
 Sand: 23% Silt: 38% Clay: 39% CEC: 22.8

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PRE	6/11/2020	8:30 AM	67/70	F	Damp	W 10 mph	59%	50% Cloudy	NA

Crop and Weed Information at Application

Date	Plant ID	Height or Diameter	Growth Stage	Density
6/11/2020	Basil Preemergence			
6/11/2020	No Weeds			

BYGR = Barnyard Grass
 LACG = Large Crabgrass
 COPU = Common Purslane
 RRPW = Redroot Pigweed

Notes and Comments

1. Spray applied with 6 nozzle boom. FF11002, 40 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
 2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
 3. Harvest: Plants were cut at the soil and weighed by variety.
-

Weed Control in Basil - IR4 - Van Drunen - 2020

Michigan State University

Weed Control in Basil - IR4 - Van Drunen - 2020

Trial ID: 117-20-1
 Protocol ID: 117-20-1
 Project ID:

Location: Momence, IL
 Study Director: Bernard Zandstra
 Sponsor Contact: Sushila Chaudhari

Trial Year: 2020

Pest Code					BYGR	LACG	COPU				
Crop Code					BASIL	BASIL					
Crop Name					PLENTY	OBSESSION					
Rating Date					02Jul2020	02Jul2020	02Jul2020	02Jul2020			
Rating Type					RATING	RATING	RATING	RATING			
Rating Unit					1-10	1-10	1-10	1-10			
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Unit	Stage					
1	Devrinol DF-XT	50DF		2lb ai/a	PRE		1.0	1.0	9.3	9.7	1.7
2	Lorox	50DF		0.25lb ai/a	PRE		1.7	3.7	5.7	4.3	7.7
3	Lorox	50DF		0.5lb ai/a	PRE		1.3	2.0	5.3	3.0	8.3
4	Spartan	4F		0.125lb ai/a	PRE		1.0	3.0	3.0	2.7	8.0
5	Spartan	4F		0.25lb ai/a	PRE		1.7	2.3	7.7	9.3	8.3
6	Ultra Blazer	2L		0.25lb ai/a	PRE		1.0	1.3	2.3	6.0	3.7
7	Ultra Blazer	2L		0.375lb ai/a	PRE		1.0	1.3	4.0	7.3	6.7
8	Ultra Blazer	2L		0.75lb ai/a	PRE		2.7	2.0	4.3	9.3	9.3
9	Untreated						1.3	1.7	1.7	4.0	1.7
LSD (P=.05)							0.99	2.81	4.46	5.24	2.21
Standard Deviation							0.57	1.62	2.58	3.03	1.28
CV							40.74	79.68	53.55	48.94	20.79

Michigan State University

Pest Code					RRPW						
Crop Code					BASIL	BASIL	BASIL	BASIL			
Crop Name					PLENTY	OBSESSION	PLENTY	OBSESSION			
Rating Date					02Jul2020	05Aug2020	05Aug2020	05Aug2020			
Rating Type					RATING	RATING	RATING	HARVEST			
Rating Unit					1-10	1-10	1-10	KG			
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Unit	Stage					
1	Devrinol DF-XT	50DF		2lb ai/a	PRE		1.0	1.0	1.0	9.8617	9.4400
2	Lorox	50DF		0.25lb ai/a	PRE		8.0	1.7	2.0	9.2183	7.1567
3	Lorox	50DF		0.5lb ai/a	PRE		9.3	1.0	2.0	12.5117	9.9000
4	Spartan	4F		0.125lb ai/a	PRE		10.0	1.0	1.0	13.6567	13.3533
5	Spartan	4F		0.25lb ai/a	PRE		10.0	1.3	2.0	9.8717	8.3050
6	Ultra Blazer	2L		0.25lb ai/a	PRE		5.7	1.0	1.0	12.4667	10.3350
7	Ultra Blazer	2L		0.375lb ai/a	PRE		8.0	1.0	1.0	13.2567	12.4867
8	Ultra Blazer	2L		0.75lb ai/a	PRE		9.3	1.7	1.7	9.8133	10.4867
9	Untreated						1.7	1.3	1.3	9.8300	7.7517
LSD (P=.05)							2.08	0.61	1.00	3.11359	4.46682
Standard Deviation							1.20	0.35	0.58	1.79875	2.58053
CV							17.17	28.93	39.97	16.11	26.03

Weed Control in Basil - IR4 - SWMREC - 2020

Project Code: 117-20-2 Location: Benton Harbor, MI
 Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker
 Crop: Basil Variety: Obsession DMR
 Planting Method: seeded Planting Date: 6/04/2020
Harvest Date: 8/26/2020
 Spacing: 1" Row Spacing: 4 rows/bed 10"
 Tillage Type: Conventional Study Design: RCB Replications: 3
 Plot Size: 5 ft wide x 30 ft long

Soil Type: Spinks loamy fine sand OM: 0.9% pH: 5.7
 Sand: 86.1% Silt: 5.5% Clay: 8.4% CEC: 3.0

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PRE	6/5/20	12:30pm	87/80	F	Dry	5-9mph	40%	35% Cloudy	No

Crop and Weed Information at Application

	Height or Diameter	Growth Stage	Density
6/5/2020 Basil Preemergence			
6/5/2020 No weeds			
LACG = Large Crabgrass			
CAWE = Carpetweed			
HAVE = Hairy Vetch			

Notes and Comments

1. Spray applied with 4 nozzle boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
 2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
 3. All plots handweeded in early July (Before July 10).
 4. Harvest: Plants were pulled from ground and weighed with roots.
-

Weed Control in Basil - IR4 - SWMREC - 2020

Michigan State University

Weed Control in Basil - IR4 - SWMREC - 2020

Trial ID:117-20-2. Location:Benton Harbor, MI Trial Year:2020
 Protocol ID:117-20-2. Investigator:Bernard Zandstra/ Sushila Chaudhari
 Study Director:Nicole Soldan

Pest Code	WEEDS		LACG	CAWE	HAVE						
Crop Code	BASIL	BASIL									
Rating Date	19Jun2020	02Jul2020	02Jul2020	02Jul2020	02Jul2020						
Rating Type	RATING	RATING	RATING	RATING	RATING						
Rating Unit	1-10	1-10	1-10	1-10	1-10						
Assessed By	BZ	BZ	BZ	BZ	BZ						
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage						
1	Devrinol DF-XT Spartan	50DF 4F		2lb ai/a 0.125lb ai/a	PRE	2.3	10.0	3.0	10.0	9.7	9.7
2	Devrinol DF-XT	50DF		2lb ai/a	PRE	2.7	10.0	2.7	10.0	7.3	9.0
3	Lorox	50DF		0.25lb ai/a	PRE	1.3	9.3	2.3	4.3	4.3	8.7
4	Lorox	50DF		0.5lb ai/a	PRE	2.7	10.0	6.0	8.3	8.0	8.3
5	Spartan	4F		0.125lb ai/a	PRE	1.7	10.0	1.7	6.0	6.0	6.0
6	Spartan	4F		0.25lb ai/a	PRE	2.0	10.0	1.7	8.3	8.0	7.3
7	Ultra Blazer	2L		0.25lb ai/a	PRE	2.7	10.0	2.0	6.3	6.7	8.7
8	Ultra Blazer	2L		0.375lb ai/a	PRE	2.7	10.0	2.0	6.3	6.3	7.3
9	Ultra Blazer	2L		0.75lb ai/a	PRE	3.0	10.0	3.0	6.7	9.3	8.7
10	Untreated					1.3	1.7	1.0	1.0	1.0	1.0
	LSD (P=.05)					0.85	0.93	2.75	2.70	3.32	2.82
	Standard Deviation					0.50	0.54	1.61	1.58	1.94	1.65
	CV					22.3	5.98	63.38	23.41	29.05	22.05

Pest Code	BASIL		BASIL	BASIL	BASIL					
Crop Code	BASIL	BASIL	BASIL	BASIL	BASIL					
Rating Date	18Jul2020	30Jul2020	04Aug2020	26Aug2020	26Aug2020					
Rating Type	RATING	RATING	RATING	RATING	HARVEST					
Rating Unit	1-10	1-10	1-10	1-10	KG/30 FT					
Assessed By	SC	SC	BZ	NS						
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage					
1	Devrinol DF-XT Spartan	50DF 4F		2lb ai/a 0.125lb ai/a	PRE	4.17	3.3	3.0	2.7	32.613
2	Devrinol DF-XT	50DF		2lb ai/a	PRE	3.50	2.7	2.3	2.3	34.053
3	Lorox	50DF		0.25lb ai/a	PRE	3.00	3.3	3.0	3.3	28.513
4	Lorox	50DF		0.5lb ai/a	PRE	6.83	7.3	5.3	5.3	21.313
5	Spartan	4F		0.125lb ai/a	PRE	1.83	1.7	2.3	2.0	37.473
6	Spartan	4F		0.25lb ai/a	PRE	2.33	1.3	2.3	1.7	39.227
7	Ultra Blazer	2L		0.25lb ai/a	PRE	2.33	2.7	2.7	3.3	34.338
8	Ultra Blazer	2L		0.375lb ai/a	PRE	1.83	2.3	2.7	2.7	33.493
9	Ultra Blazer	2L		0.75lb ai/a	PRE	1.67	1.3	2.3	2.3	34.033
10	Untreated					1.00	1.0	2.7	2.0	32.513
	LSD (P=.05)					2.435	2.51	2.92	2.52	10.1213
	Standard Deviation					1.419	1.46	1.70	1.47	5.8749
	CV					49.8	54.24	59.33	53.11	17.93

Weed Control in Celeriac - HTRC - 2020

Project Code: 113-20-1

Location: East Lansing, MI

Block:67

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker

Crop: Celeriac

Variety: Brilliant

Planting Method: Transplant

Planting Date: 6/1/2020

Harvest Date: 9/15/2020

Spacing: 22 inches

Row Spacing: 36 inches

Tillage Type: Conventional

Study Design: RCB Replications: 3

Plot Size: 5.3 ft wide x 30 ft long

Soil Type: Marlette Fine Sandy Loam OM: 2.4%

pH: 7.1

Sand: 40% Silt: 35%

Clay: 25%

CEC: 11.6

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
POTP	6/2/2020	9-10 AM	68/61	F	NA	3 mph	62%	20% Cloudy	NA

Crop and Weed Information at Application

		Height or Diameter	Growth Stage	Density
6/2/2020	Celeriac	6"	2 to 3 leaf stage	
6/2/2020	No weeds present			

Notes and Comments

1. Spray applied with 4 nozzle boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO₂ backpack sprayer.
 2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
 3. Caparol (1 lb ai/ac) plus Select Max (10 oz/ac) applied as maintenance treatment throughout the study area on June 22, 2020; this treatment substituted for treatment #1 PO1 application. A second application of Select Max was made on July 23, 2020.
 4. For first two rating at June 9 and 16, no injury was reported and weed control ranged from 9 to 10 for all the plots.
 5. Zidua injury was reported mainly as crop stunting.
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Weed Control in Celeriac - HTRC - 2020

Michigan State University

Weed Control in Celeriac - HTRC - 2020

Trial ID:113-20-1 Location:East Lansing, MI Trial Year:2020
 Protocol ID:113-20-1 Investigator:Sushila Chaudhari
 Project ID: Study Director:Bernard Zandstra

Pest Code	BYGR	LACG	COPU	RRPW
Crop Code	CELERICAC			
Rating Date	22Jun2020	22Jun2020	22Jun2020	22Jun2020
Rating Type	RATING	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10	1-10
Assessed By	BZ	BZ	BZ	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage	BYGR	LACG	COPU	RRPW
1	Untreated					POTP	1.0	1.0	1.0	1.0
	Caparol	4L		2lb ai/a		PO1				
2	Caparol FL	4F		1lb ai/a		POTP	2.0	10.0	9.3	10.0
3	Caparol FL	4F		2lb ai/a		POTP	2.3	10.0	10.0	10.0
4	Lorox	50DF		1lb ai/a		POTP	2.0	10.0	9.0	10.0
5	Dual Magnum	7.62EC		1.9lb ai/a		POTP	2.3	10.0	10.0	10.0
6	Chateau SW	51WDG	0.096lb ai/a			POTP	2.0	10.0	10.0	10.0
7	Zidua	4.17SC	0.106lb ai/a			POTP	2.3	10.0	10.0	10.0
8	Zidua	4.17SC	0.133lb ai/a			POTP	2.3	10.0	10.0	10.0
9	Prowl H2O	3.8CS	1.9lb ai/a			POTP	1.3	10.0	9.7	10.0
10	Prowl H2O	3.8CS	1.9lb ai/a			POTP	1.7	10.0	10.0	10.0
	Chateau SW	51WDG	0.032lb ai/a			POTP				
	LSD (P=.05)						1.08	0.00	1.06	0.00
	Standard Deviation						0.63	0.00	0.62	0.00
	CV						32.56	0.0	6.97	0.0

Pest Code	YENS	WEEDS	YENS	CELERICAC
Crop Code	CELERICAC			CELERICAC
Rating Date	22Jun2020	30Jun2020	30Jun2020	07Jul2020
Rating Type	RATING	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10	1-10
Assessed By	BZ	BZ	BZ	SC

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage	YENS	WEEDS	YENS	CELERICAC
1	Untreated					POTP	1.0	1.3	8.0	5.7
	Caparol	4L		2lb ai/a		PO1				
2	Caparol FL	4F		1lb ai/a		POTP	2.3	1.3	7.7	6.0
3	Caparol FL	4F		2lb ai/a		POTP	5.0	2.3	9.7	8.7
4	Lorox	50DF		1lb ai/a		POTP	5.7	2.3	9.3	8.7
5	Dual Magnum	7.62EC		1.9lb ai/a		POTP	10.0	2.3	9.0	10.0
6	Chateau SW	51WDG	0.096lb ai/a			POTP	5.7	2.0	9.0	8.7
7	Zidua	4.17SC	0.106lb ai/a			POTP	6.0	3.0	8.7	7.3
8	Zidua	4.17SC	0.133lb ai/a			POTP	9.0	4.0	9.7	9.3
9	Prowl H2O	3.8CS	1.9lb ai/a			POTP	1.0	1.0	8.7	3.7
10	Prowl H2O	3.8CS	1.9lb ai/a			POTP	3.0	1.7	8.3	7.7
	Chateau SW	51WDG	0.032lb ai/a			POTP				
	LSD (P=.05)						4.01	0.98	0.98	2.47
	Standard Deviation						2.33	0.57	0.57	1.44
	CV						47.98	26.91	6.49	19.07

Weed Control in Celeriac - HTRC - 2020

Pest Code	COPU	CUDO	RRPW	YENS	CELERICAC	
Crop Code					13Jul2020	13Jul2020
Rating Date	07Jul2020	07Jul2020	07Jul2020	07Jul2020		
Rating Type	RATING	RATING	RATING	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10	1-10	1-10	1-10
Assessed By	SC	SC	SC	SC	BZ	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Unit	Growth Stage	COPU	CUDO	RRPW	YENS	CELERICAC	CELERICAC
1	Untreated					POTP	10.0	10.00	10.0	10.00	1.7	8.3
	Caparol	4L		2lb	ai/a	PO1						
2	Caparol FL	4F		1lb	ai/a	POTP	10.0	6.50	10.0	2.00	1.0	2.7
3	Caparol FL	4F		2lb	ai/a	POTP	10.0	9.00	10.0	5.83	1.7	5.7
4	Lorox	50DF		1lb	ai/a	POTP	10.0	9.83	10.0	6.17	1.7	6.0
5	Dual Magnum	7.62EC		1.9lb	ai/a	POTP	10.0	9.17	10.0	10.00	2.3	10.0
6	Chateau SW	51WDG		0.096lb	ai/a	POTP	10.0	9.83	10.0	6.00	1.7	5.0
7	Zidua	4.17SC		0.106lb	ai/a	POTP	10.0	9.33	10.0	6.83	4.0	5.7
8	Zidua	4.17SC		0.133lb	ai/a	POTP	10.0	9.33	10.0	9.00	3.7	9.0
9	Prowl H20	3.8CS		1.9lb	ai/a	POTP	10.0	9.43	10.0	2.00	1.0	1.0
10	Prowl H20	3.8CS		1.9lb	ai/a	POTP	10.0	9.00	10.0	3.50	1.3	2.0
	Chateau SW	51WDG		0.032lb	ai/a	POTP						
	LSD (P=.05)						0.00	1.349	0.00	2.348	0.82	3.51
	Standard Deviation						0.00	0.786	0.00	1.369	0.48	2.05
	CV						0.0	8.6	0.0	22.32	23.77	36.99

Pest Code	CELERICAC	CELERICAC	CELERICAC	CELERICAC	CELERICAC	CELERICAC
Crop Code						
Rating Date	23Jul2020	12Aug2020	15Sep2020	15Sep2020	15Sep2020	15Sep2020
Rating Type	RATING	RATING	HARVEST	HARVEST	HARVEST	HARVEST
Rating Unit	1-10	1-10	NO. ROOT	KG ROOT	KG SHOOT	KG TOTAL
Assessed By	BZ	BZ				

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Unit	Growth Stage	COPU	CUDO	RRPW	YENS	CELERICAC	CELERICAC	CELERICAC	CELERICAC
1	Untreated					POTP	1.0	1.3	33.0	12.383	5.133	17.517		
	Caparol	4L		2lb	ai/a	PO1								
2	Caparol FL	4F		1lb	ai/a	POTP	1.0	1.0	32.0	11.593	5.210	16.803		
3	Caparol FL	4F		2lb	ai/a	POTP	1.0	1.3	31.3	10.660	5.105	15.765		
4	Lorox	50DF		1lb	ai/a	POTP	1.3	2.0	33.3	12.107	5.967	18.073		
5	Dual Magnum	7.62EC		1.9lb	ai/a	POTP	1.7	2.0	33.3	12.097	5.340	17.437		
6	Chateau SW	51WDG		0.096lb	ai/a	POTP	1.7	1.7	33.3	12.595	5.485	18.080		
7	Zidua	4.17SC		0.106lb	ai/a	POTP	3.0	3.3	32.3	8.137	4.347	12.483		
8	Zidua	4.17SC		0.133lb	ai/a	POTP	3.0	3.7	29.0	7.152	4.282	11.433		
9	Prowl H20	3.8CS		1.9lb	ai/a	POTP	1.0	1.0	33.0	11.688	5.355	17.043		
10	Prowl H20	3.8CS		1.9lb	ai/a	POTP	1.0	1.3	32.7	12.235	5.130	17.365		
	Chateau SW	51WDG		0.032lb	ai/a	POTP								
	LSD (P=.05)						0.92	1.05	6.85	2.0498	1.4881	3.3161		
	Standard Deviation						0.53	0.61	3.99	1.19488	0.86745	1.93310		
	CV						34.09	32.77	12.34	10.8	16.89	11.93		

**Evaluation of 2 formulations of Pyridate for Efficacy & Crop
Tolerance on Cabbage & Cauliflower**

Project Code: 114-20-1

Location: HTRC, East Lansing, MI
Block:129

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker	Variety: Blue Vantage & Candid Charm
Crop: Cabbage & Cauliflower	Planting Date: June 2, 2020
Planting Method: Transplant	Harvest Date: see data
Spacing: 22 in	Row Spacing: 36 in; 1 row of each crop/plot
Tillage Type: Conventional	Study Design: RCB Replications: 3
Plot Size: 5.3 ft wide x 30 ft long	

Soil Type: Marlette Fine Sandy Loam	OM: 1.3%	pH: 7.2
Sand: 49%	Silt: 26%	Clay: 25%
		CEC: 9.6

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PRETRA	6/01/20	12:00pm	73/74	F	Dry	SW 3-4mph	90%	90% Cloudy	NO
PO1	6/29/20	10:40am	81/72	F	Moist	SE 1-2mph	50%	0% Cloudy	Yes

Crop and Weed Information at Application

		Height or Diameter	Growth Stage	Density
6/01/20	Crop & Weeds	0	NA/PRETRA	NA
6/29/20	Cabbage/Cauliflower	8-10"	6-8 LS	Good
6/29/20	COPU = Common Purslane	2-12"	Vegetative	Many in Control Plots
6/29/20	COLQ = Common Lambsquarters	2-6"	Vegetative	Many
6/29/20	RRPW = Redroot Pigweed	2-10"	Vegetative	Many
	WIRA = Wild Radish	2-5"	Vegetative	Few to Moderate

Notes and Comments

1. Spray applied with 4 nozzle boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
 2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
 3. At the time of PO1 application, weeds were mainly present in nontreated plots and alleys. The above listed weed height is also from nontreated plots and alleys. There were very few weeds present in all the treated plots (received first application of Dual Magnum) with height range of 2 to 4 inches.
 4. The injury ratings included bleaching, necrosis, and leaf deformation (only in Stinger treatment). There was no crop stunting reported from any of the treatments at any rating.
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**Evaluation of 2 formulations of Pyridate for Efficacy & Crop
Tolerance on Cabbage & Cauliflower**

Michigan State University

Evaluation of 2 Formulations of Pyridate for Efficacy & Crop Tolerance on Cabbage & Cauliflower

Trial ID:20-181 Location:HTRC, East Lansing, MI Trial Year: 2020
 Protocol ID:114-20-1 Investigator: Sushila Chaudhari
 Study Director: Bernard Zandstra

Pest Code					COLQ	COPU	RRPW	
Crop Code					CABBAGE	CAULI		
Rating Date					07Jul2020	07Jul2020	07Jul2020	
Rating Type					RATING	RATING	RATING	
Rating Unit					1-10	1-10	1-10	
Assessed By					SC	SC	SC	
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage			
	1Handweeded Check					1.00	1.00	10.00
	2Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	1.67	1.50	9.77
	3Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.50	2.43	10.00
	TOUGH	5	EC	0.47lb ai/a	PO1			
	4Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	1.67	2.00	9.40
	Lentagran	45	WP	0.47lb ai/a	PO1			
	5Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.67	3.43	9.67
	GoalTender	4	SC	0.25lb ai/a	PO1			
	Select Max	0.97	EC	0.12lb ai/a	PO1			
	6Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.83	3.17	10.00
	TOUGH	5	EC	0.62lb ai/a	PO1			
	7Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.10	2.50	9.87
	Lentagran	45	WP	0.62lb ai/a	PO1			
	8Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	3.70	4.17	9.77
	GoalTender	4	SC	0.25lb ai/a	PO1			
	Select Max	0.97	EC	0.12lb ai/a	PO1			
	Stinger	3	L	0.094lb ae/a	PO1			
	LSD (P=.05)					0.726	0.791	0.379
	Standard Deviation					0.414	0.452	0.216
	CV					18.28	17.89	2.21
								0.244
								0.139
								1.4
								0.183
								0.104
								1.05

Evaluation of 2 formulations of Pyridate for Efficacy & Crop Tolerance on Cabbage & Cauliflower

Pest Code	WIRA									
Crop Code	CABBAGE		CAULI	CABBAGE						
Rating Date	07Jul2020	07Jul2020	07Jul2020	13Jul2020						
Rating Type	RATING	STAND COUNT	STAND COUNT	RATING						
Rating Unit	1-10	#/PLOT	#/PLOT	1-10						
Assessed By	SC	SC	SC	SC						
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage				
1	Handweeded Check						10.00	15.7	15.3	1.00
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	10.00	14.7	14.3	1.00
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	10.00	15.0	15.3	2.50
	TOUGH	5	EC	0.47lb	ai/a	PO1				
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	9.83	15.0	14.7	1.67
	Lentagran	45	WP	0.47lb	ai/a	PO1				
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	10.00	14.7	15.0	1.50
	GoalTender	4	SC	0.25lb	ai/a	PO1				
	Select Max	0.97	EC	0.12lb	ai/a	PO1				
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	10.00	15.0	14.0	3.17
	TOUGH	5	EC	0.62lb	ai/a	PO1				
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	10.00	15.7	13.7	1.83
	Lentagran	45	WP	0.62lb	ai/a	PO1				
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	10.00	15.7	14.3	2.00
	GoalTender	4	SC	0.25lb	ai/a	PO1				
	Select Max	0.97	EC	0.12lb	ai/a	PO1				
	Stinger	3	L	0.094lb	ae/a	PO1				
	LSD (P=.05)						0.179	1.67	2.84	0.616
	Standard Deviation						0.102	0.95	1.62	0.351
	CV						1.02	6.29	11.14	19.17

Pest Code	COLQ				COPU		RRPW		CABBAGE		
Crop Code	CAULI		CABBAGE		CABBAGE		CABBAGE		CABBAGE		
Rating Date	13Jul2020	13Jul2020	13Jul2020	13Jul2020	13Jul2020	13Jul2020	13Jul2020	13Jul2020	20Jul2020		
Rating Type	RATING	RATING	RATING	RATING	RATING	RATING	RATING	RATING	RATING		
Rating Unit	1-10	1-10	1-10	1-10	1-10	1-10	1-10	1-10	1-10		
Assessed By	SC	SC	SC	SC	SC	SC	SC	SC	SC		
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage					
1	Handweeded Check						1.00	10.00	10.0	10.00	1.3
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.00	9.00	10.0	10.00	1.3
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.67	9.67	10.0	10.00	2.3
	TOUGH	5	EC	0.47lb	ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.00	9.00	10.0	10.00	1.3
	Lentagran	45	WP	0.47lb	ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.00	9.67	10.0	10.00	1.7
	GoalTender	4	SC	0.25lb	ai/a	PO1					
	Select Max	0.97	EC	0.12lb	ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	3.17	10.00	10.0	9.98	2.7
	TOUGH	5	EC	0.62lb	ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.00	9.33	10.0	10.00	2.0
	Lentagran	45	WP	0.62lb	ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.50	9.83	10.0	9.83	1.7
	GoalTender	4	SC	0.25lb	ai/a	PO1					
	Select Max	0.97	EC	0.12lb	ai/a	PO1					
	Stinger	3	L	0.094lb	ae/a	PO1					
	LSD (P=.05)						0.619	0.945	0.00	0.185	1.08
	Standard Deviation						0.354	0.536	0.00	0.105	0.62
	CV						17.32	5.6	0.0	1.05	34.45

Evaluation of 2 formulations of Pyridate for Efficacy & Crop Tolerance on Cabbage & Cauliflower

Pest Code	COLQ					COPU		RRPW			
Crop Code	CAULI					CABBAGE					
Rating Date	20Jul2020	20Jul2020	20Jul2020	20Jul2020	20Jul2020	20Jul2020	20Jul2020	27Jul2020	27Jul2020		
Rating Type	RATING	RATING	RATING	RATING	RATING	RATING	RATING	RATING	RATING		
Rating Unit	1-10	1-10	1-10	1-10	1-10	1-10	1-10	1-10	1-10		
Assessed By	SC	SC	SC	SC	SC	SC	SC	SC	SC		
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage					
1	Handweeded Check						1.3	10.0	10.0	10.0	1.0
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.3	8.0	10.0	10.0	1.0
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.0	9.0	10.0	10.0	1.7
	TOUGH		5EC	0.47lb	ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	9.0	10.0	10.0	1.0
	Lentagran		45WP	0.47lb	ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.0	9.0	10.0	10.0	1.3
	GoalTender		4SC	0.25lb	ai/a	PO1					
	Select Max		0.97EC	0.12lb	ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.0	9.7	10.0	10.0	1.7
	TOUGH		5EC	0.62lb	ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	8.0	10.0	10.0	1.3
	Lentagran		45WP	0.62lb	ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	9.3	10.0	10.0	1.0
	GoalTender		4SC	0.25lb	ai/a	PO1					
	Select Max		0.97EC	0.12lb	ai/a	PO1					
	Stinger		3L	0.094lb	ae/a	PO1					
	LSD (P=.05)						0.96	1.41	0.00	0.00	0.65
	Standard Deviation						0.55	0.81	0.00	0.00	0.37
	CV						32.25	8.95	0.0	0.0	29.6

Pest Code	COLQ					COPU		RRPW			
Crop Code	CAULI					CABBAGE					
Rating Date	27Jul2020	27Jul2020	27Jul2020	27Jul2020	27Jul2020	27Jul2020	27Jul2020	31Jul2020	31Jul2020		
Rating Type	RATING	RATING	RATING	RATING	RATING	RATING	RATING	HARVEST	HARVEST		
Rating Unit	1-10	1-10	1-10	1-10	1-10	1-10	1-10	NO./PLOT	NO./PLOT		
Assessed By	SC	SC	SC	SC	SC	SC	SC				
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage					
1	Handweeded Check						1.0	10.0	10.0	10.0	4.7
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.0	8.3	10.0	10.0	5.0
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	9.0	10.0	10.0	3.0
	TOUGH		5EC	0.47lb	ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.0	8.7	10.0	10.0	4.3
	Lentagran		45WP	0.47lb	ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.3	8.3	10.0	10.0	2.7
	GoalTender		4SC	0.25lb	ai/a	PO1					
	Select Max		0.97EC	0.12lb	ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	9.3	10.0	10.0	4.3
	TOUGH		5EC	0.62lb	ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.3	8.3	10.0	10.0	3.7
	Lentagran		45WP	0.62lb	ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.0	8.7	10.0	10.0	4.7
	GoalTender		4SC	0.25lb	ai/a	PO1					
	Select Max		0.97EC	0.12lb	ai/a	PO1					
	Stinger		3L	0.094lb	ae/a	PO1					
	LSD (P=.05)						0.65	1.38	0.00	0.00	5.66
	Standard Deviation						0.37	0.79	0.00	0.00	3.23
	CV						29.6	8.91	0.0	0.0	80.01

**Evaluation of 2 formulations of Pyridate for Efficacy & Crop
Tolerance on Cabbage & Cauliflower**

Pest Code	Crop Code	Rating Date	Rating Type	Rating Unit	Assessed By	CABBAGE	CABBAGE	CABBAGE	CABBAGE	CABBAGE	
		31Jul2020	06Aug2020	06Aug2020	12Aug2020	12Aug2020					
		HARVEST	HARVEST	HARVEST	HARVEST	HARVEST					
		KG./PLOT	NO./PLOT	KG./PLOT	NO./PLOT	KG./PLOT					
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage					
1	Handweeded Check						6.8517	3.7	5.673	2.7	3.807
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	6.6700	4.7	7.213	1.0	1.500
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	3.8550	9.0	13.973	1.0	1.380
	TOUGH	5	EC	0.47lb	ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	6.4433	5.0	8.007	1.0	1.460
	Lentagran	45	WP	0.47lb	ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	3.6850	5.7	9.040	3.3	5.373
	GoalTender	4	SC	0.25lb	ai/a	PO1					
	Select Max	0.97	EC	0.12lb	ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	5.9917	8.3	13.213	0.3	0.593
	TOUGH	5	EC	0.62lb	ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	5.3083	6.0	9.540	2.7	4.133
	Lentagran	45	WP	0.62lb	ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	6.5350	7.0	11.887	1.3	2.160
	GoalTender	4	SC	0.25lb	ai/a	PO1					
	Select Max	0.97	EC	0.12lb	ai/a	PO1					
	Stinger	3	L	0.094lb	ae/a	PO1					
	LSD (P=.05)						8.43598	4.59	7.2909	2.72	4.1691
	Standard Deviation						4.81675	2.62	4.1630	1.55	2.3805
	CV						84.99	42.48	42.4	93.16	93.32

Pest Code	Crop Code	Rating Date	Rating Type	Rating Unit	Assessed By	CABBAGE	CABBAGE	CABBAGE	CABBAGE	CABBAGE	
		17Aug2020	17Aug2020	24Aug2020	24Aug2020						
		HARVEST	HARVEST	HARVEST	HARVEST					TOTAL	
		NO./PLOT	KG./PLOT	NO./PLOT	KG./PLOT	NO./PLOT				NO./PLOT	
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage					
1	Handweeded Check						2.0	2.407	1.7	1.780	14.7
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	2.360	2.0	2.187	14.3
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	0.3	0.460	1.3	1.427	14.7
	TOUGH	5	EC	0.47lb	ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.3	1.667	3.0	3.240	14.7
	Lentagran	45	WP	0.47lb	ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.3	2.293	1.0	0.940	14.0
	GoalTender	4	SC	0.25lb	ai/a	PO1					
	Select Max	0.97	EC	0.12lb	ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	0.0	0.000	1.3	1.300	14.3
	TOUGH	5	EC	0.62lb	ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.7	2.653	2.3	1.933	16.3
	Lentagran	45	WP	0.62lb	ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	0.3	0.440	2.0	2.753	15.3
	GoalTender	4	SC	0.25lb	ai/a	PO1					
	Select Max	0.97	EC	0.12lb	ai/a	PO1					
	Stinger	3	L	0.094lb	ae/a	PO1					
	LSD (P=.05)						2.28	3.2035	2.49	2.6297	2.15
	Standard Deviation						1.30	1.8291	1.42	1.5015	1.23
	CV						120.02	119.16	77.6	77.2	8.3

**Evaluation of 2 formulations of Pyridate for Efficacy & Crop
Tolerance on Cabbage & Cauliflower**

Pest Code										
Crop Code	CABBAGE	CAULI	CAULI	CAULI	CAULI					
Rating Date		06Aug2020	06Aug2020	10Aug2020	10Aug2020					
Rating Type	TOTAL	HARVEST	HARVEST	HARVEST	HARVEST					
Rating Unit	KG/PLOT	NO./PLOT	KG/PLOT	NO./PLOT	KG/PLOT					
Assessed By										
Trt No.	Treatment Name	Form Conc	Form Type	Rate Unit	Growth Stage					
1	Handweeded Check					20.5183	2.0	1.420	6.7	4.707
2	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	19.9300	2.0	1.667	6.3	4.867
3	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	21.0950	1.0	0.893	3.7	2.993
	TOUGH	5	EC	0.47lb ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	20.8167	1.7	1.447	5.0	4.133
	Lentagran	45	WP	0.47lb ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	21.3317	2.3	2.293	3.3	2.480
	GoalTender	4	SC	0.25lb ai/a	PO1					
	Select Max	0.97	EC	0.12lb ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	21.0983	1.7	1.340	4.3	2.927
	TOUGH	5	EC	0.62lb ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	23.5683	2.3	2.127	4.3	3.993
	Lentagran	45	WP	0.62lb ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	23.7750	3.7	3.693	5.7	4.060
	GoalTender	4	SC	0.25lb ai/a	PO1					
	Select Max	0.97	EC	0.12lb ai/a	PO1					
	Stinger	3	L	0.094lb ae/a	PO1					
	LSD (P=.05)					4.31167	3.27	3.1505	3.58	2.6402
	Standard Deviation					2.46187	1.87	1.7988	2.04	1.5075
	CV					11.44	89.57	96.71	41.52	39.99

Pest Code										
Crop Code	CAULI	CAULI	CAULI	CAULI	CAULI					
Rating Date	14Aug2020	14Aug2020	17Aug2020	17Aug2929	24Aug2020					
Rating Type	HARVEST	HARVEST	HARVEST	HARVEST	HARVEST					
Rating Unit	NO./PLOT	KG/PLOT	NO./PLOT	KG/PLOT	NO./PLOT					
Assessed By										
Trt No.	Treatment Name	Form Conc	Form Type	Rate Unit	Growth Stage					
1	Handweeded Check					4.0	2.620	0.0	0.000	2.3
2	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	3.3	2.587	0.3	0.207	1.3
3	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.7	2.073	1.3	0.913	4.0
	TOUGH	5	EC	0.47lb ai/a	PO1					
4	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	4.3	3.613	0.0	0.000	1.7
	Lentagran	45	WP	0.47lb ai/a	PO1					
5	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	3.0	2.087	0.0	0.000	3.3
	GoalTender	4	SC	0.25lb ai/a	PO1					
	Select Max	0.97	EC	0.12lb ai/a	PO1					
6	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.3	1.980	1.3	0.940	3.0
	TOUGH	5	EC	0.62lb ai/a	PO1					
7	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	3.0	2.307	0.7	0.487	2.0
	Lentagran	45	WP	0.62lb ai/a	PO1					
8	Dual Magnum	7.62	EC	1.3lb ai/a	PRETRA	2.3	1.867	0.7	0.473	1.0
	GoalTender	4	SC	0.25lb ai/a	PO1					
	Select Max	0.97	EC	0.12lb ai/a	PO1					
	Stinger	3	L	0.094lb ae/a	PO1					
	LSD (P=.05)					3.67	2.7241	1.05	0.7048	2.39
	Standard Deviation					2.10	1.5554	0.60	0.4024	1.36
	CV					67.11	65.04	110.33	106.61	58.5

**Evaluation of 2 formulations of Pyridate for Efficacy & Crop
Tolerance on Cabbage & Cauliflower**

Pest Code			
Crop Code		CAULI	CAULI CAULI
Rating Date		24Aug2020	
Rating Type		HARVEST	TOTAL TOTAL
Rating Unit		KG/PLOT	NO./PLOT KG/PLOT
Assessed By			

Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage			
1	Handweeded Check						1.393	15.0	10.140
2	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	0.633	13.3	9.960
3	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.100	12.7	8.973
	TOUGH	5	EC	0.47lb	ai/a	PO1			
4	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	0.933	12.7	10.127
	Lentagran	45	WP	0.47lb	ai/a	PO1			
5	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.860	12.0	8.720
	GoalTender	4	SC	0.25lb	ai/a	PO1			
	Select Max	0.97	EC	0.12lb	ai/a	PO1			
6	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	2.127	12.7	9.313
	TOUGH	5	EC	0.62lb	ai/a	PO1			
7	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	1.140	12.3	10.053
	Lentagran	45	WP	0.62lb	ai/a	PO1			
8	Dual Magnum	7.62	EC	1.3lb	ai/a	PRETRA	0.700	13.3	10.793
	GoalTender	4	SC	0.25lb	ai/a	PO1			
	Select Max	0.97	EC	0.12lb	ai/a	PO1			
	Stinger	3	L	0.094lb	ae/a	PO1			
	LSD (P=.05)						1.4718	3.60	3.3017
	Standard Deviation						0.8403	2.05	1.8852
	CV						61.75	15.79	19.32
	Replicate F						2.374	3.203	1.234
	Replicate Prob(F)						0.1295	0.0715	0.3209
	Treatment F						1.566	0.610	0.407
	Treatment Prob(F)						0.2247	0.7389	0.8826

Performance of Quizalofop on Dill - IR4 - 2020

Project Code: 117-20-3

Location: HTRC, East Lansing, MI
Block:68

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker
Crop: Dill
Planting Method: Seeded

Variety: Mammoth
Planting Date: 5/26/2020
Harvest Date:7/27/2020
Row Spacing: 3 rows at 14"
Study Design: RCB Replications: 3

Spacing: 1"
Tillage Type: Conventional
Plot Size: 5.3 ft wide x 30 ft long

Soil Type: Marlette Fine Sandy Loam OM: 1.9% pH: 7.1
Sand: 41% Silt: 34% Clay: 25% CEC: 10.2

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PO1	7/1/2020	9:20 AM	85/73	F	Damp	SE 1-3mph	60%	0% Cloudy	No

Crop and Weed Information at Application

		Height or Diameter	Growth Stage	Density
7/1/2020	Dill	2-4"	Vegetative	Variable
7/1/2020	WIGR = Witchgrass	4-6"	Veg	Moderate
	Yellow foxtail	4-6"	veg	few

Notes and Comments

1. Spray applied with 4 nozzle boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
 2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
 3. Variable stand at PO1 application
 4. Hand weeded all plots of nutsedge and broad leaves prior to application.
 5. Grasses in plots: green foxtail, yellow foxtail, large crabgrass, and Witchgrass.
 6. Maintenance sprays applied preemergence on 5/27/20 of 5-27-20 Caparol at 3.2 pt/acre and then postemergence on 6/22/20 of Caparol 1 lb ai/ac
-

Performance of Quizalofop on Dill - IR4 - 2020

Michigan State University

Performance of Quizalofop on Dill - IR-4 - 2020

Trial ID: 117-20-3 Location: HTRC Trial Year: 2020
 Protocol ID: 117-20-3 Study Director: Bernard Zandstra
 Project ID: 117-20-3 Sponsor Contact: Sushila Chaudhari

Pest Code	Crop Code	Rating Date	Rating Type	Rating Unit	GRASSES		WIGR			
					DILL		DILL			
					09Jul2020	09Jul2020	09Jul2020	13Jul2020		
					RATING	RATING	RATING	RATING		
					1-10	1-10	1-10	1-10		
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit	Growth Stage				
1	Untreated Weed-Free Check						1.0	1.0	1.0	1.5
2	Assure II	0.88EC		0.048lb ai/a		PO1	1.0	9.7	9.7	1.8
	NIS	100SL		0.25% v/v		PO1				
3	Assure II	0.88EC		0.096lb ai/a		PO1	1.3	10.0	10.0	1.2
	NIS	100SL		0.25% v/v		PO1				
4	Assure II	0.88EC		0.193lb ai/a		PO1	1.3	10.0	10.0	2.0
	NIS	100SL		0.25% v/v		PO1				
5	Lorox	50DF		1.0lb ai/a		PO1	3.0	5.7	5.7	2.5
6	Select Max	0.97EC		0.09lb ai/a		PO1	1.7	9.7	10.0	1.7
	NIS	100SL		0.25% v/v		PO1				
7	Caparol	4L		1.0lb ai/a		PO1	1.7	2.7	2.7	1.3
	LSD (P=.05)						0.96	0.82	0.67	0.86
	Standard Deviation						0.54	0.46	0.38	0.48
	CV						34.48	6.56	5.4	28.2

Pest Code	Crop Code	Rating Date	Rating Type	Rating Unit	GRASSES		WIGR			
					DILL		DILL			
					13Jul2020	14Jul2020	21Jul2020	21Jul2020		
					RATING	RATING	RATING	RATING		
					1-10	1-10	1-10	1-10		
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit	Growth Stage				
1	Untreated Weed-Free Check						5.3	1.7	1.3	3.0
2	Assure II	0.88EC		0.048lb ai/a		PO1	10.0	1.3	1.7	8.3
	NIS	100SL		0.25% v/v		PO1				
3	Assure II	0.88EC		0.096lb ai/a		PO1	10.0	1.7	1.3	10.0
	NIS	100SL		0.25% v/v		PO1				
4	Assure II	0.88EC		0.193lb ai/a		PO1	10.0	2.0	1.3	10.0
	NIS	100SL		0.25% v/v		PO1				
5	Lorox	50DF		1.0lb ai/a		PO1	4.7	2.3	2.0	6.0
6	Select Max	0.97EC		0.09lb ai/a		PO1	10.0	2.0	1.3	10.0
	NIS	100SL		0.25% v/v		PO1				
7	Caparol	4L		1.0lb ai/a		PO1	2.7	2.7	1.3	1.0
	LSD (P=.05)						3.35	1.99	1.42	4.23
	Standard Deviation						1.88	1.12	0.80	2.38
	CV						25.01	57.17	53.98	34.4

Performance of Quizalofop on Dill - IR4 - 2020

					GRASSES					
					DILL		DILL		DILL	
					22Jul2020	22Jul2020	27Jul2020	27Jul2020		
					RATING	RATING	HARVEST	HARVEST		
					1-10	1-10	#/PLOT	KG/30 FT		
Trt	Treatment	Form	Form	Rate	Growth					
No.	Name	Conc	Type	Rate	Unit	Stage				
1	Untreated Weed-Free Check						1.0	1.0	91.0	7.25
2	Assure II	0.88EC		0.048lb	ai/a	PO1	1.0	8.3	98.0	9.04
	NIS	100SL		0.25%	v/v	PO1				
3	Assure II	0.88EC		0.096lb	ai/a	PO1	1.0	9.4	114.3	8.78
	NIS	100SL		0.25%	v/v	PO1				
4	Assure II	0.88EC		0.193lb	ai/a	PO1	1.7	9.7	110.0	9.04
	NIS	100SL		0.25%	v/v	PO1				
5	Lorox	50DF		1.0lb	ai/a	PO1	1.7	5.0	104.0	7.39
6	Select Max	0.97EC		0.09lb	ai/a	PO1	1.3	9.0	102.0	9.26
	NIS	100SL		0.25%	v/v	PO1				
7	Caparol	4L		1.0lb	ai/a	PO1	1.0	1.7	87.0	6.57
	LSD (P=.05)						0.65	0.67	35.94	3.53
	Standard Deviation						0.37	0.37	20.20	1.98
	CV						29.67	5.91	20.02	24.23

Performance of Linuron on Green Onion - IR4 - Schreur - 2020

Project Code: 112-20-3

Location: Hudsonville, MI

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker
 Crop: Green Onion Variety: Ishikura Improved
 Planting Method: Seeded Planting Date: 5/6/2020
 Harvest Date: 7/16/2020
 Spacing: 1.25" Row Spacing: 20"; 2 rows/plot
 Tillage Type: Conventional Study Design: RCB Replications: 3
 Plot Size: 2.7 ft wide x 30 ft long

Soil Type: Carlisle Muck OM: 42% pH: 5.5
 Sand: 52% Silt: 5% Clay: 1% CEC: NA

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PO1	6/12/20	10:00AM	61/NA	F	Moist	NE 3-5mph	65%	95% Cloudy	No

Crop and Weed Information at Application

	Height or Diameter	Growth Stage	Density
6/12/2020 Onion		2 LS	Variable
6/12/2020 RRPW = Redroot Pigweed	2-6"	Vegetative	Many
6/12/2020 COPU = Common Purslane	05.3"	Veg	Many
6/12/2020 LATH = Ladysthumb	2-4"	Veg	Moderate
6/12/2020 MAYC = Marsh Yellowcress	2-4"	Veg	Few
6/12/2020 YENS = Yellow Nutsedge	4-8"	Veg	Many
CEPR = Common Evening Primrose			
COLQ = Common Lambsquarters			
FLWE = Flixweed			

Notes and Comments

1. Spray applied with 2 nozzle shielded boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
3. First Replicate was flooded causing low germination.

Michigan State University

Performance of Linuron on Green Onion - IR4 - Schreur - 2020

Trial ID: 112-20-3
 Protocol ID: 112-20-3
 Project ID:

Location: Hudsonville, MI
 Study Director: Dr. Bernard Zandstra
 Sponsor Contact: Sushila Chaudhari

Trial Year: 2020

Pest Code				CEPR	COLQ	COPU	FLWE			
Crop Name				GRN ONION						
Rating Date				19Jun2020	19Jun2020	19Jun2020	19Jun2020	19Jun2020		
Rating Type				RATING	RATING	RATING	RATING	RATING		
Rating Unit				1-10	1-10	1-10	1-10	1-10		
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage					
	1 Handweeded				PRE	1.0	7.0	7.0	6.3	1.0
	2 Linex 4F	4F		0.25lb ai/a	PO1	4.0	9.0	10.0	10.0	6.7
	3 Linex 4F	4F		0.5lb ai/a	PO1	4.0	10.0	10.0	10.0	8.0
	4 Linex 4F	4F		1lb ai/a	PO1	6.3	10.0	10.0	10.0	9.7
	5 GoalTender	4SC		0.125lb ai/a	PO1	3.7	9.0	10.0	10.0	7.0
	6 Caparol	4L		1.6lb ai/a	PO1	5.0	10.0	9.7	10.0	9.3
	7 Chateau SW	51WDG		0.032lb ai/a	PO1	6.0	9.0	10.0	8.3	3.7
	8 Nortron	4SC		0.5lb ai/a	PO1	6.0	9.3	10.0	10.0	3.3
	LSD (P=.05)					4.35	3.69	3.26	3.08	4.40
	Standard Deviation					2.48	2.11	1.86	1.76	2.51
	CV					55.18	22.97	19.44	18.83	41.27

Pest Code				LATH	RRPW	GRN ONION		CEPR	COLQ	
Crop Name										
Rating Date				19Jun2020	19Jun2020	30Jun2020	30Jun2020	30Jun2020	30Jun2020	
Rating Type				RATING	RATING	RATING	RATING	RATING	RATING	
Rating Unit				1-10	1-10	1-10	1-10	1-10	1-10	
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage					
	1 Handweeded				PRE	1.7	3.3	1.0	7.0	6.7
	2 Linex 4F	4F		0.25lb ai/a	PO1	8.3	8.3	2.7	9.0	10.0
	3 Linex 4F	4F		0.5lb ai/a	PO1	9.0	9.3	3.0	10.0	10.0
	4 Linex 4F	4F		1lb ai/a	PO1	9.3	10.0	4.7	10.0	10.0
	5 GoalTender	4SC		0.125lb ai/a	PO1	9.0	8.7	2.0	6.3	10.0
	6 Caparol	4L		1.6lb ai/a	PO1	9.7	9.3	3.7	10.0	10.0
	7 Chateau SW	51WDG		0.032lb ai/a	PO1	7.7	6.3	3.7	8.0	7.3
	8 Nortron	4SC		0.5lb ai/a	PO1	9.7	8.7	4.7	9.7	9.3
	LSD (P=.05)					1.85	3.21	2.80	3.64	3.67
	Standard Deviation					1.06	1.83	1.60	2.08	2.09
	CV					13.15	22.88	50.46	23.77	22.85

Performance of Linuron on Green Onion - IR4 - Schreur - 2020

Pest Code	COPU					LATH	FLWE	RRPW			
Crop Name									GRN ONION		
Rating Date	30Jun2020					30Jun2020	30Jun2020	30Jun2020	30Jun2020	16Jul2020	
Rating Type	RATING					RATING	RATING	RATING	RATING	RATING	
Rating Unit	1-10					1-10	1-10	1-10	1-10	1-10	
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit Unit	Growth Stage					
1	Handweeded					PRE	4.0	6.3	7.0	6.0	1.0
2	Linex 4F	4F		0.25lb ai/a		PO1	6.3	7.3	7.0	5.0	3.7
3	Linex 4F	4F		0.5lb ai/a		PO1	8.3	8.0	8.7	7.3	5.7
4	Linex 4F	4F		1lb ai/a		PO1	9.0	8.3	9.7	8.7	5.7
5	GoalTender	4SC		0.125lb ai/a		PO1	9.7	6.3	5.7	3.3	4.3
6	Caparol	4L		1.6lb ai/a		PO1	9.0	8.0	8.0	8.3	4.7
7	Chateau SW	51 WDG		0.032lb ai/a		PO1	4.0	7.0	5.0	3.3	6.0
8	Nortron	4SC		0.5lb ai/a		PO1	8.0	5.7	5.7	5.0	6.0
	LSD (P=.05)						3.08	5.26	4.97	3.51	3.52
	Standard Deviation						1.76	3.00	2.84	2.00	2.01
	CV						24.15	42.16	40.03	34.07	43.47

Pest Code										
Crop Name									GRN ONION	
Rating Date									16Jul2020	
Rating Type									HARVEST	
Rating Unit									KG/30 FT	
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit Unit	Growth Stage				
1	Handweeded					PRE	3.5283			
2	Linex 4F	4F		0.25lb ai/a		PO1	1.1600			
3	Linex 4F	4F		0.5lb ai/a		PO1	0.8900			
4	Linex 4F	4F		1lb ai/a		PO1	0.7233			
5	GoalTender	4SC		0.125lb ai/a		PO1	2.5700			
6	Caparol	4L		1.6lb ai/a		PO1	2.0933			
7	Chateau SW	51 WDG		0.032lb ai/a		PO1	0.9067			
8	Nortron	4SC		0.5lb ai/a		PO1	1.9967			
	LSD (P=.05)						2.20473			
	Standard Deviation						1.25885			
	CV						72.62			

Performance of Linuron on Green Onion - IR4 - SWMREC - 2020

Project Code: 112-20-4

Location: SWMREC, MI

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker
 Crop: Green Onion Variety: Ishikura Improved
 Planting Method: seeded Planting Date: 7/16/20
 Harvest Date: 10/9/20
 Spacing: 0.5 inch Row Spacing: 14 inch; 2 rows/bed
 Tillage Type: Conventional Study Design: RCB Replications: 3
 Plot Size: 2.7 ft wide x 30 ft long

Soil Type: Spinks Loamy Fine Sand OM: 0.9% pH: 5.7
 Sand: 86% Silt: 6% Clay: 8% CEC: 3

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PO1	8/26/20	11:00AM	85/77	F	Damp	SW 6-9mph	65%	0% Cloudy	No

Crop and Weed Information at Application

		Height or Diameter	Growth Stage	Density
8/26/20	Green Onion	6-8"	2 LS	Good
8/26/20	LACG = Large Crabgrass	10-20"	Flower-Vegetative	Few
8/26/20	HAVE = Hairy Vetch	3-10"	Vegetative	Few-Moderate
8/26/20	COLQ = Common Lambsquarters	2-4"	Vegetative	Few
8/26/20	RRPW = Redroot Pigweed	2-4"	Vegetative	Few
	CEPR= Common Evening Primrose			
	CAWE = Carpetweed			

Notes and Comments

1. Spray applied with 2 nozzle boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
3. Prowl H2O at 1.9 lb ai/acre applied to whole field after seeding.
3. Postemergence application made at full 2 leaf stage; 3rd leaf was just emerging.

Michigan State University

Performance of Linuron on Green Onion - IR4 - SWMREC - 2020

Trial ID:112-20-4 Location:SWMREC Trial Year:2020
 Protocol ID:112-20-4 Investigator:Bernard Zandstra
 Study Director:Sushila Chaudhari

Pest Code					HAVE	CEPR	COLQ	
Crop Name	GRN ONION							
Rating Date	09Sep2020				09Sep2020	09Sep2020	09Sep2020	
Rating Type	RATING				RATING	RATING	RATING	
Rating Unit	1-10				1-10	1-10	1-10	
Assessed By	SC				SC	SC	SC	
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage			
1	Handweeded				PRE	1.0	1.0	1.0
2	Linex 4F	4F		0.25lb ai/a	PO1	2.7	8.0	8.7
3	Linex 4F	4F		0.5lb ai/a	PO1	4.7	9.7	10.0
4	Linex 4F	4F		1lb ai/a	PO1	6.7	9.7	10.0
5	GoalTender	4SC		0.125lb ai/a	PO1	1.3	7.3	9.0
6	Caparol	4L		1.6lb ai/a	PO1	5.7	8.0	9.7
7	Chateau SW	51WDG		0.032lb ai/a	PO1	3.7	8.3	9.0
8	Nortron	4SC		0.5lb ai/a	PO1	1.3	5.7	9.0
LSD (P=.05)						0.98	1.87	1.40
Standard Deviation						0.56	1.07	0.80
CV						16.64	14.83	9.67

Pest Code					CAWE	HAVE	CEPR	
Crop Name					GRN ONION			
Rating Date					09Sep2020	18Sep2020	18Sep2020	
Rating Type					RATING	RATING	RATING	
Rating Unit					1-10	1-10	1-10	
Assessed By					SC	SC	SC	
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage			
1	Handweeded				PRE	1.0	1.0	1.0
2	Linex 4F	4F		0.25lb ai/a	PO1	9.3	2.0	5.7
3	Linex 4F	4F		0.5lb ai/a	PO1	10.0	4.3	8.3
4	Linex 4F	4F		1lb ai/a	PO1	10.0	6.0	9.0
5	GoalTender	4SC		0.125lb ai/a	PO1	9.7	1.0	5.7
6	Caparol	4L		1.6lb ai/a	PO1	10.0	5.3	5.3
7	Chateau SW	51WDG		0.032lb ai/a	PO1	10.0	2.7	6.7
8	Nortron	4SC		0.5lb ai/a	PO1	7.7	1.3	3.0
LSD (P=.05)						0.68	0.89	2.66
Standard Deviation						0.38	0.51	1.52
CV						4.53	17.1	27.18

Performance of Linuron on Green Onion - IR4 - SWMREC - 2020

Pest Code	COLQ		OVERALL	HAVE					
Crop Name	18Sep2020		18Sep2020	GRN ONION					
Rating Date	RATING		RATING	09Oct2020	09Oct2020				
Rating Type	1-10		1-10	1-10	1-10				
Rating Unit	SC		SC	SC	SC				
Assessed By	SC		SC	SC	SC				
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage	COLQ	OVERALL	GRN ONION	HAVE
1	Handweeded				PRE	1.0	1.0	1.0	7.0
2	Linex 4F	4F		0.25lb ai/a	PO1	9.0	8.0	1.3	4.7
3	Linex 4F	4F		0.5lb ai/a	PO1	10.0	9.0	2.7	8.0
4	Linex 4F	4F		1lb ai/a	PO1	10.0	9.0	5.0	8.7
5	GoalTender	4SC		0.125lb ai/a	PO1	7.3	6.7	1.0	3.3
6	Caparol	4L		1.6lb ai/a	PO1	10.0	7.3	4.7	4.3
7	Chateau SW	51WDG		0.032lb ai/a	PO1	7.0	6.7	2.0	5.7
8	Nortron	4SC		0.5lb ai/a	PO1	8.3	5.0	1.0	3.0
LSD (P=.05)						4.19	2.24	0.76	3.80
Standard Deviation						2.39	1.28	0.44	2.17
CV						30.56	19.43	18.7	38.81

Pest Code	CEPR		COLQ	OVERALL	GRN ONION				
Crop Name	09Oct2020		09Oct2020	09Oct2020	09Oct2020				
Rating Date	RATING		RATING	RATING	HARVEST				
Rating Type	1-10		1-10	1-10	KG/PLOT				
Rating Unit	SC		SC	SC	SC				
Assessed By	SC		SC	SC	SC				
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage	CEPR	COLQ	OVERALL	GRN ONION
1	Handweeded				PRE	10.0	10.0	10.0	4.4883
2	Linex 4F	4F		0.25lb ai/a	PO1	6.7	9.0	6.3	4.7783
3	Linex 4F	4F		0.5lb ai/a	PO1	8.7	9.7	8.3	2.4600
4	Linex 4F	4F		1lb ai/a	PO1	9.3	10.0	8.7	2.6550
5	GoalTender	4SC		0.125lb ai/a	PO1	5.0	6.0	4.0	5.7017
6	Caparol	4L		1.6lb ai/a	PO1	7.0	9.3	5.3	2.5850
7	Chateau SW	51WDG		0.032lb ai/a	PO1	6.3	6.3	6.0	3.7233
8	Nortron	4SC		0.5lb ai/a	PO1	6.0	8.0	4.0	7.9867
LSD (P=.05)						3.12	3.74	2.55	2.76972
Standard Deviation						1.78	2.14	1.45	1.58145
CV						24.15	25.01	22.08	36.8

Weed Control in Mint - Irrer - 2020

Project Code: 121-20-1

Location: St Johns, MI

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker, Doug Irrer

Crop: Mint

Variety: Native Spearmint

Planting Method: Roots

Planting Date: 2018

Spacing: Meadow

Row Spacing: Solid

Tillage Type: NA

Study Design: RCB Replications: 3

Plot Size: 6 ft wide x 40 ft long

Soil Type: Capac Loam

OM: 2.6%

pH: 6.5

Sand: 81%

Silt: 11%

Clay: 8%

CEC: 5.4

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PRE	4/2/20	NA	55/NA	F	NA	NW 5 mph	NA	NA	NA

Crop and Weed Information at Application

Plant ID	Height or Diameter	Growth Stage	Density
FIPA = Field Pansy			
PUDN = Purple Deadnettle			

Notes and Comments

1. Spray applied Tjet 80015, 15 gpa, 21 psi, 3.2 mph, CO2 backpack sprayer.
 2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.
 3. Due to Covid-19 shutdown, the grower applied treatments so not all weather or weed data at time of herbicide application is available.
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Weed Control in Mint - Irrer - 2020

Michigan State University

Weed Control in Mint – Irrer – 2020

Trial ID:121-20-1 Location:St. Johns, MI Trial Year: 2020
 Protocol ID:121-20-1 Investigator:Bernard Zandstra
 Study Director:Sushila Chaudhari

Pest Code	Crop Code	PUDN		FIPA							
		MINT	MINT	MINT	MINT						
Rating Date	Rating Type	21May2020	21May2020	04Jun2020	24Jun2020						
Rating Unit	Assessed By	RATING	RATING	RATING	RATING						
		1-10	1-10	1-10	1-10						
		BZ	BZ	BZ	BZ						
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Unit	Stage					
1	Sharpen	2.85	SC	0.089lb ai/a	Dormant		5.0	9.3	4.0	10.0	2.3
	MSO	100	SL	1% v/v	Dormant						
	Bronc	100	SL	2% v/v	Dormant						
2	Goal 2XL	2	EC	0.312lb ai/a	Dormant		2.7	9.7	2.3	9.7	1.3
	Gramoxone 2SL	2	SL	0.325lb ai/a	Dormant						
	Sinbar	80	WDG	0.32lb ai/a	Dormant						
	NIS	100	SL	0.25% v/v	Dormant						
3	Zidua	4.17	SC	0.09lb ai/a	Dormant		1.7	4.7	2.3	6.3	1.7
4	Zidua	4.17	SC	0.180lb ai/a	Dormant		2.0	4.0	2.0	7.3	1.7
5	Sharpen	2.85	SC	0.045lb ai/a	Dormant		4.7	10.0	4.3	10.0	2.7
	Bronc	100	L	2% v/v	Dormant						
	MSO	100	SL	1% v/v	Dormant						
6	Spartan	4	F	0.312lb ai/a	Dormant		3.3	10.0	3.7	9.3	2.0
7	Valor	51	WDG	0.128lb ai/a	Dormant		4.0	8.0	3.3	9.3	1.7
8	Sharpen	2.85	SC	0.045lb ai/a	Dormant		5.3	8.7	4.0	7.7	2.7
	Zidua	4.17	SC	0.09lb ai/a	Dormant						
9	Aim	2	EC	0.019lb ai/a	Dormant		2.0	8.7	2.0	7.3	1.0
	Zidua	4.17	SC	0.09lb ai/a	Dormant						
	NIS	100	SL	0.25% v/v	Dormant						
10	Valor	51	WDG	0.128lb ai/a	Dormant		6.7	10.0	5.0	9.7	3.0
	Zidua	4.17	SC	0.09lb ai/a	Dormant						
11	Sharpen	2.85	SC	0.133lb ai/a	Dormant		7.7	10.0	5.7	10.0	3.0
	MSO	100	SL	1% v/v	Dormant						
	Bronc	100	SL	2% v/v	Dormant						
12	Non-Treated						1.0	1.0	1.0	4.0	1.0
	LSD (P=.05)						1.33	2.11	1.38	3.02	1.17
	Standard Deviation						0.78	1.25	0.81	1.78	0.69
	CV						20.44	15.91	24.65	21.25	34.54

Performance of Clopyralid on Grape - IR4 - HTRC - 2020

Project Code: 132-20-1

Location: East Lansing, MI
Block:37

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker
 Crop: Grape Variety: Concord
 Planting Method: Planting Date: 1967
 Harvest Date: 9/29/2020
 Spacing: 7 ft; 4 vines/plot Row Spacing: 10 ft
 Tillage Type: NA Study Design: RCB Replications: 3
 Plot Size: 6 ft wide x 30 ft long

Soil Type: Capac Loam OM: 3.7% pH: 7.4
 Sand: 51% Silt: 28% Clay: 21% CEC: 13.5

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PO1	6/8/20	10:40am	77/80	F	Dry	2-4mph	36%	30% Cloudy	No
PO2	7/6/20	11:00am	93/76	F	Dry	1-2mph	54%	2% Cloudy	No

Crop and Weed Information at Application

Date	Crop	Height or Diameter	Growth Stage	Density
6/8/2020	Grape	5'	Pre-Bloom	Good
6/8/2020	WICA = Wild Carrot	5-10"	Vegetative	Many
6/8/2020	FIBW = Field Bindweed	6-18"	Flower	Many
6/8/2020	VICR = Virginia Creeper	6-10"	Veg	Moderate
6/8/2020	SFGE = Smallflower Geranium	6-12"	Flower	Moderate
6/8/2020	WHCL = White Clover	4-8"	Flower	Many
6/8/2020	PEST = Perennial Sowthistle	2-5"	Veg	Moderate
6/8/2020	QUGR = Quackgrass	10-18"	Flower	Many
6/8/2020	CATH = Canada Thistle	24"		Many
7/6/2020	Grape	5'	Green Fruit	Good
7/6/2020	WICA = Wild Carrot	12-24"	Flower	Many
7/6/2020	WHCL = White Clover	2-6"	Flower	Many
7/6/2020	PEST = Perennial Sowthistle	4-8"	Veg	Moderate
7/6/2020	FIBW = Field Bindweed	10-30"	Flower	Many
7/6/2020	ROFB = Rough Fleabane	12-26"	Flower	Moderate

Notes and Comments

1. Spray applied with 2 nozzle shielded boom. FF11002, 17.79 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.

Michigan State University

Performance of Clopyralid on Grape - IR4 - HTRC - 2020

Trial ID:132-20-1 Location:East Lansing, MI Trial Year:2020
 Protocol ID:132-20-1 Investigator:Dr. Bernard Zandstra/ S. Chaudhari
 Study Director:Nicole Soldan

Pest Code	GRAPE		FIBW
Crop Code	GRAPE	GRAPE	
Rating Date	08Jun2020	26Jun2020	26Jun2020
Rating Type	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10
Assessed By	BZ/NS	BZ/NS	BZ/NS

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage			
1	Untreated Weed-Free Check						2.0	1.0	1.0
2	Stinger	3L		0.25lb	ae/a	PO1, PO2	2.3	2.3	1.0
	NIS	100SL		0.25%	v/v	PO1, PO2			
3	Stinger	3L		0.5lb	ae/a	PO1	3.0	3.0	1.0
	NIS	100SL		0.25%	v/v	PO1			
	LSD (P=.05)						1.77	1.51	0.00
	Standard Deviation						0.78	0.67	0.00
	CV						31.98	31.58	0.0

Pest Code	WHCL	WICA	GRAPE
Crop Code			GRAPE
Rating Date	26Jun2020	26Jun2020	06Jul2020
Rating Type	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10
Assessed By	BZ/NS	BZ/NS	NS

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage			
1	Untreated Weed-Free Check						1.0	1.0	1.0
2	Stinger	3L		0.25lb	ae/a	PO1, PO2	10.0	6.3	2.3
	NIS	100SL		0.25%	v/v	PO1, PO2			
3	Stinger	3L		0.5lb	ae/a	PO1	10.0	5.3	3.3
	NIS	100SL		0.25%	v/v	PO1			
	LSD (P=.05)						0.00	5.37	0.76
	Standard Deviation						0.00	2.37	0.33
	CV						0.0	56.1	15.0

Performance of Clopyralid on Grape - IR4 - HTRC - 2020

Pest Code	FIBW	ROFB	PEST
Crop Code			
Rating Date	06Jul2020	06Jul2020	06Jul2020
Rating Type	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10
Assessed By	NS	NS	NS

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage	FIBW	ROFB	PEST
1	Untreated Weed-Free Check						1.0	1.0	1.0
2	Stinger	3L		0.25lb ae/a		PO1, PO2	1.0	10.0	10.0
	NIS	100SL		0.25% v/v		PO1, PO2			
3	Stinger	3L		0.5lb ae/a		PO1	1.0	10.0	10.0
	NIS	100SL		0.25% v/v		PO1			
	LSD (P=.05)						0.00	0.00	0.00
	Standard Deviation						0.00	0.00	0.00
	CV						0.0	0.0	0.0

Pest Code	WHCL	WICA	GRAPE
Crop Code			
Rating Date	06Jul2020	06Jul2020	20Jul2020
Rating Type	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10
Assessed By	NS	NS	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage	WHCL	WICA	GRAPE
1	Untreated Weed-Free Check						1.0	1.0	1.0
2	Stinger	3L		0.25lb ae/a		PO1, PO2	10.0	8.0	2.7
	NIS	100SL		0.25% v/v		PO1, PO2			
3	Stinger	3L		0.5lb ae/a		PO1	10.0	9.7	3.0
	NIS	100SL		0.25% v/v		PO1			
	LSD (P=.05)						0.00	0.76	0.76
	Standard Deviation						0.00	0.33	0.33
	CV						0.0	5.36	15.0

Pest Code	CATH	FIBW	PEST
Crop Code			
Rating Date	20Jul2020	20Jul2020	20Jul2020
Rating Type	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10
Assessed By	BZ	BZ	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Growth Stage	CATH	FIBW	PEST
1	Untreated Weed-Free Check						4.0	1.0	4.0
2	Stinger	3L		0.25lb ae/a		PO1, PO2	10.0	2.7	10.0
	NIS	100SL		0.25% v/v		PO1, PO2			
3	Stinger	3L		0.5lb ae/a		PO1	10.0	1.7	10.0
	NIS	100SL		0.25% v/v		PO1			
	LSD (P=.05)						6.80	4.41	6.80
	Standard Deviation						3.00	1.94	3.00
	CV						37.5	109.33	37.5

Performance of Clopyralid on Grape - IR4 - HTRC - 2020

Pest Code		WHCL	WICA
Crop Code			
Rating Date		20Jul2020	20Jul2020
Rating Type		RATING	RATING
Rating Unit		1-10	1-10
Assessed By		BZ	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage		
1	Untreated Weed-Free Check						1.0	1.0
2	Stinger	3L		0.25lb ae/a		PO1, PO2	10.0	6.3
	NIS	100SL		0.25% v/v		PO1, PO2		
3	Stinger	3L		0.5lb ae/a		PO1	9.7	9.0
	NIS	100SL		0.25% v/v		PO1		
	LSD (P=.05)						0.76	2.72
	Standard Deviation						0.33	1.20
	CV						4.84	22.07

Pest Code			WHCL	WICA
Crop Code		GRAPE		
Rating Date		07Aug2020	07Aug2020	07Aug2020
Rating Type		RATING	RATING	RATING
Rating Unit		1-10	1-10	1-10
Assessed By		BZ	BZ	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage			
1	Untreated Weed-Free Check						1.0	1.0	1.0
2	Stinger	3L		0.25lb ae/a		PO1, PO2	3.7	10.0	10.0
	NIS	100SL		0.25% v/v		PO1, PO2			
3	Stinger	3L		0.5lb ae/a		PO1	3.3	10.0	10.0
	NIS	100SL		0.25% v/v		PO1			
	LSD (P=.05)						1.85	0.00	0.00
	Standard Deviation						0.82	0.00	0.00
	CV						30.62	0.0	0.0

Pest Code				
Crop Code		GRAPE	GRAPE	
Rating Date		29Sep2020	29Sep2020	
Rating Type		HARVEST	HARVEST	
Rating Unit		NO./PLOT	KG/PLOT	
Assessed By				

Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Growth Stage		
1	Untreated Weed-Free Check						567.7	32.9483
2	Stinger	3L		0.25lb ae/a		PO1, PO2	613.7	33.2767
	NIS	100SL		0.25% v/v		PO1, PO2		
3	Stinger	3L		0.5lb ae/a		PO1	421.3	24.0583
	NIS	100SL		0.25% v/v		PO1		
	LSD (P=.05)						400.07	16.66352
	Standard Deviation						176.51	7.35179
	CV						33.04	24.43

**Postemergence Field Bindweed Control in Concord Grapes -
HTRC - 2020**

Project Code: 132-20-2

Location: East Lansing, MI
Block:

Personnel: Sushila Chaudhari, Bernard H. Zandstra, Nicole Soldan, Monique Hemker
 Crop: Grape Variety: Concord
 Planting Method: NA Planting Date: 1967
 Spacing: 7 ft; 4 vines/plot Row Spacing: 10 ft
 Tillage Type: NA Study Design: RCB Replications: 3
 Plot Size: 5.3 ft wide x 30 ft long

Soil Type: Capac Loam OM: 3.7% pH: 7.4
 Sand: 52% Silt: 28% Clay: 21% CEC: 13.5

Herbicide Application Information

Timing	Date	Time	Air/Soil	T	Soil Surf	Wind	RH	Sky	Dew
PO1	6/09/2020	11:00am	83/75	F	DRY	4-6 SE	33	20% Cloudy	N

Crop and Weed Information at Application

		Height or Diameter	Growth Stage	Density
6/09/20	Grape	5-6'	Pre-Bloom	Good
6/09/20	PEST = Perennial Sowthistle	4-10"	Vegetative	Many
6/09/20	FIBW = Field Bindweed	4-10"	Vegetative	Many
6/09/20	DAND = Dandelion	4-8"	Flower/Vegetative	Moderate
6/09/20	GORO = Goldenrod	10-18"	Vegetative	Moderate
6/09/20	VICR = Virginia Creeper	6-12"	Vegetative	Many
6/09/20	SFGR = Smallflower Geranium	2-4"	Flower	Moderate
6/09/20	CUDO = Curly Dock	12-18"	Flower	Moderate
6/09/20	WICA = Wild Carrot	4-12"	Vegetative	Moderate
6/09/20	CATH = Canada Thistle	10-18"	Vegetative	Many
6/09/20	WHCL = White Clover	2-6"	Flower	Many
6/09/20	COMW = Common Milkweed	12-24"	Bud	Moderate
	COMA = Common Mallow			

Notes and Comments

1. Spray applied with 2 nozzle shielded boom. FF11002, 20 gpa, 30 psi, 3.2 mph, CO2 backpack sprayer.
2. Crop and weed injury ratings on scale of 1-10; 1 = no injury, 10 = complete kill.

**Postemergence Field Bindweed Control in Concord Grapes -
HTRC - 2020**

Michigan State University

Postemergence Field Bindweed Control in Concord Grapes-HTRC- 2020

Trial ID:132-20-3 Location:HTRC, East Lansing, MI Trial Year:2020
 Protocol ID:132-20-2 Investigator:Sushila Chaudhari
 Project ID:132-20-2 Study Director:Nicole Soldan

Pest Code				CATH	DAND	FIBW
Crop Code						
Rating Date				24Jun2020	24Jun2020	24Jun2020
Rating Type				RATING	RATING	RATING
Rating Unit				1-10	1-10	1-10
Assessed By				SC	SC	SC
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Unit	Stage
1	Untreated					
2	Roundup PowerMax	5.5L		1lb ai/a	PO1	
	N Pak (AMS)	100L		2.5% v/v	PO1	
3	Rely 280	2.34L		1lb ai/a	PO1	
	N Pak (AMS)	100L		2.5% v/v	PO1	
4	Rely 280	2.34L		1.02lb ai/a	PO1	
	Venue	0.177SC		0.0055lb ai/a	PO1	
	N Pak (AMS)	100L		2.5% v/v	PO1	
5	Gramoxone SL	2SL		1lb ai/a	PO1	
	NIS	100SL		0.25% v/v	PO1	
6	Quinstar	3.8L		0.25lb ai/a	PO1	
7	Embed-Extra	3.8L		1lb ai/a	PO1	
8	Stinger	3L		0.125lb ai/a	PO1	
9	Zeus Prime XC	3.5EC		0.41lb ai/a	PO1	
	Select Max	0.97EC		0.12lb ai/a	PO1	
	COC	100SL		1lb ai/a	PO1	
	LSD (P=.05)			2.00	3.16	1.75
	Standard Deviation			1.08	1.83	1.01
	CV			22.91	36.03	20.74

**Postemergence Field Bindweed Control in Concord Grapes -
HTRC - 2020**

Pest Code		PEST	CATH	DAND	FIBW				
Crop Code									
Rating Date		24Jun2020	07Jul2020	07Jul2020	07Jul2020				
Rating Type		RATING	RATING	RATING	RATING				
Rating Unit		1-10	1-10	1-10	1-10				
Assessed By		SC	SC	SC	SC				
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage				
1	Untreated					1.00	1.00	1.00	1.00
2	Roundup PowerMax N Pak (AMS)	5.5L		1lb ai/a	PO1	7.00	7.83	6.67	8.50
3	Rely 280 N Pak (AMS)	2.34L		1lb ai/a	PO1	3.90	5.33	5.00	4.33
4	Rely 280 Venue N Pak (AMS)	2.34L		1.02lb ai/a	PO1	4.65	5.00	5.17	5.83
		0.177SC		0.0055lb ai/a	PO1				
5	Gramoxone SL NIS	2SL		1lb ai/a	PO1	2.67	3.50	4.00	3.17
		100SL		0.25% v/v	PO1				
6	Quinstar	3.8L		0.25lb ai/a	PO1	3.00	6.00	5.67	5.33
7	Embed-Extra	3.8L		1lb ai/a	PO1	6.33	8.33	6.33	9.50
8	Stinger	3L		0.125lb ai/a	PO1	8.33	8.00	6.00	1.33
9	Zeus Prime XC	3.5EC		0.41lb ai/a	PO1	1.00	1.00	3.67	9.70
	Select Max	0.97EC		0.12lb ai/a	PO1				
	COC	100SL		1lb ai/a	PO1				
LSD (P=.05)						3.584	1.399	2.683	1.242
Standard Deviation						2.046	0.808	1.550	0.717
CV						48.6	15.81	32.07	13.26

Pest Code			CATH	COMA					
Crop Code		GRAPE							
Rating Date		20Jul2020	20Jul2020	20Jul2020					
Rating Type		RATING	RATING	RATING					
Rating Unit		1-10	1-10	1-10					
Assessed By		BZ	BZ	BZ					
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage				
1	Untreated					1.3	5.5	4.0	
2	Roundup PowerMax N Pak (AMS)	5.5L		1lb ai/a	PO1	2.7	8.5	4.7	
3	Rely 280 N Pak (AMS)	2.34L		1lb ai/a	PO1	1.3	10.0	7.0	
4	Rely 280 Venue N Pak (AMS)	2.34L		1.02lb ai/a	PO1	2.3	4.5	10.0	
		0.177SC		0.0055lb ai/a	PO1				
5	Gramoxone SL NIS	2SL		1lb ai/a	PO1	1.7	7.3	9.7	
		100SL		0.25% v/v	PO1				
6	Quinstar	3.8L		0.25lb ai/a	PO1	1.0	7.7	10.0	
7	Embed-Extra	3.8L		1lb ai/a	PO1	3.0	5.5	4.0	
8	Stinger	3L		0.125lb ai/a	PO1	2.3	6.0	7.0	
9	Zeus Prime XC	3.5EC		0.41lb ai/a	PO1	1.7	5.0	7.0	
	Select Max	0.97EC		0.12lb ai/a	PO1				
	COC	100SL		1lb ai/a	PO1				
LSD (P=.05)						1.85	7.06	6.90	
Standard Deviation						1.07	3.88	3.98	

**Postemergence Field Bindweed Control in Concord Grapes -
HTRC - 2020**

CV 52.45 61.63 54.34

Pest Code	FIBW	PEST	WHCL	WICA
Crop Code				
Rating Date	20Jul2020	20Jul2020	20Jul2020	20Jul2020
Rating Type	RATING	RATING	RATING	RATING
Rating Unit	1-10	1-10	1-10	1-10
Assessed By	BZ	BZ	BZ	BZ

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage	FIBW	PEST	WHCL	WICA
1	Untreated					1.3	1.3	1.3	1.0
2	Roundup PowerMax	5.5L		1lb ai/a	PO1	3.7	7.7	3.7	7.3
	N Pak (AMS)	100L		2.5% v/v	PO1				
3	Rely 280	2.34L		1lb ai/a	PO1	1.0	7.7	8.0	8.3
	N Pak (AMS)	100L		2.5% v/v	PO1				
4	Rely 280	2.34L		1.02lb ai/a	PO1	3.0	9.0	8.3	9.3
	Venue	0.177SC		0.0055lb ai/a	PO1				
	N Pak (AMS)	100L		2.5% v/v	PO1				
5	Gramoxone SL	2SL		1lb ai/a	PO1	1.0	8.3	4.7	10.0
	NIS	100SL		0.25% v/v	PO1				
6	Quinstar	3.8L		0.25lb ai/a	PO1	5.7	9.3	8.0	4.3
7	Embed-Extra	3.8L		1lb ai/a	PO1	8.3	7.0	6.0	9.3
8	Stinger	3L		0.125lb ai/a	PO1	1.3	7.0	10.0	7.0
9	Zeus Prime XC	3.5EC		0.41lb ai/a	PO1	9.3	3.0	6.3	6.7
	Select Max	0.97EC		0.12lb ai/a	PO1				
	COC	100SL		1lb ai/a	PO1				
LSD (P=.05)						1.62	3.82	3.50	4.06
Standard Deviation						0.93	2.21	2.02	2.35
CV						21.37	35.44	34.09	32.0

**Postemergence Field Bindweed Control in Concord Grapes -
HTRC - 2020**

Pest Code				CATH	DAND	FIBW	
Crop Code				GRAPE			
Rating Date				22Jul2020	22Jul2020	22Jul2020	
Rating Type				RATING	RATING	RATING	
Rating Unit				1-10	1-10	1-10	
Assessed By				SC	SC	SC	
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Growth Stage		
1	Untreated					1.0	1.0
2	Roundup PowerMax	5.5L		1lb ai/a	PO1	1.0	6.0
	N Pak (AMS)	100L		2.5% v/v	PO1		5.3
3	Rely 280	2.34L		1lb ai/a	PO1	1.0	2.7
	N Pak (AMS)	100L		2.5% v/v	PO1		3.0
4	Rely 280	2.34L		1.02lb ai/a	PO1	1.0	2.7
	Venue	0.177SC		0.0055lb ai/a	PO1		3.0
	N Pak (AMS)	100L		2.5% v/v	PO1		
5	Gramoxone SL	2SL		1lb ai/a	PO1	1.0	1.3
	NIS	100SL		0.25% v/v	PO1		1.3
6	Quinstar	3.8L		0.25lb ai/a	PO1	1.0	4.7
7	Embed-Extra	3.8L		1lb ai/a	PO1	2.3	7.3
8	Stinger	3L		0.125lb ai/a	PO1	2.7	7.7
9	Zeus Prime XC	3.5EC		0.41lb ai/a	PO1	1.7	1.0
	Select Max	0.97EC		0.12lb ai/a	PO1		4.3
	COC	100SL		1lb ai/a	PO1		8.0
	LSD (P=.05)					1.05	1.27
	Standard Deviation					0.61	0.73
	CV					43.24	19.21
							26.11
							17.2