

Crop Profile for Corn (Field) in Vermont

Prepared: February, 1999

General Production Information



- Vermont ranks twentieth in the nation for field corn production, and contributes less than 1% of the total.
- In 1997, 95000 acres of field corn were grown in Vermont; 88000 acres were harvested for silage while the remaining 7000 acres were produced as High Moisture Ear Corn.
- The total crop cash value was \$46,728,000 while production cost for the year was \$3,602,830.

Production Regions:

- NW – St. Albans – (Franklin, Chittenden and Lamoille Counties)
- NE – St. Johnsbury – (Orleans, Essex, and Caledonia Counties)
- Central – Barre – (Washington and Orange Counties)
- SE – Brattleboro – (Windham and Bennington Counties)
- SW – Rutland – (Rutland, Addison and Windsor Counties)

Cultural Practices

Four soil types exist: I Spodosols the most dominant accounts for approximately 80% of the Vermont soils and are found in the central portion of the state from north to south. II Inceptisols are found on the eastern and western state borders and from north to south. III Alfisols are found in the Champlain Valley along the lake. IV Entisols make are dominant in Franklin County, the states northwest corner. Soil preparation includes limited no-tillage culture, much limited-tillage culture and some traditional moldboard tillage culture in spring and in fall especially on heavy soils in Addison County. Soils are often limed to above pH 6.0, although some soils in the southwest have more neutral pH.

Planting time varies greatly within the state relative to soil drainage, topography and spring weather. Planting usually begins in mid May in mildest areas and ends in mid June. Growing degree days range from 1400 to 2400 and hybrids with days to relative maturity from 70 to 120 are usually chosen. Seeding rates in high moisture ear corn are often near 30,000 plants per acre with expected harvest populations of 26,000 to 28,000 plants per acre and in silage corn near 32,000 to 34,000 plants per acre with expected harvest populations near 30,000 plants per acre. Nutrient management is often but not extensively aided by soil tests. Nitrogen fertilization is predominantly sod crops and manure with urea or ammonium nitrate as starter and side-dressing. Limited interplanting of white clover during continuous corn years is utilized. Presidedress nitrate tests are commonly utilized. Potash is usually high on Vermont soils from high manure applications but low potash soils are

granularly amended either at planting or side-dressed, and granular phosphorous is usually banded with full recommended application at planting each season. Corn is often continually grown on bottom land, but rotations with alfalfa, grass, and grass-legume mixtures are common and requisite on less fertile soils with two to three years in corn and three to five years in sod crops. Soybeans are also being introduced in rotation with corn on a few farms. A few farms are also using small grains and small grain/legume mixes in corn rotations.

Weed control is almost exclusively accomplished with herbicide applications although some farms, especially certified organic producers, use cultivation along with a few white clover interplanting strategies. Triazine application preplant and preemergence are the most common control methods, although pre and postemergence applications of a variety of herbicides is not uncommon and a mixture of atrazine with other herbicides is often favored. Triazine resistant biotypes of common lambsquarters, smooth pigweed, common ragweed, and common groundsel have created a need for other methods of control. Minimal late season applications are used for control of weeds which are an impediment to harvest.

The most important insect pests of field corn in Vermont are the European corn borer, the western and northern corn rootworm, and cutworm. Other insect pests include armyworm, seed corn maggot, wireworm, hopvine borer, thrips and potato stem borer. European corn borer control is most often accomplished with traditional tillage or taking corn as chopped silage. Chemical treatments are usually not economical as control methods. Northern and western corn rootworms are most often controlled with rotation, early planting, and planting varieties with good standability. Chemical treatments during adult stages is recommended when more than 55 adults per 55 plants are present if the field will be in corn again. Cutworm control is accomplished with late planting, good weed control and avoidance of low wet areas. Treatment is recommended if more than 5% of plants have been cut. Seed treatment with insecticide for seed corn maggot is almost universal. Armyworm is an occasional problem in weedy fields and chemical treatment is rarely economical. Wireworm is controllable only with discing of affected crops and chemical treatment of soil followed by replanting. Hopvine borer and potato stem borer are localized in infestation and are controlled with proper weed control.

Harvest of silage corn begins in late August and continues through October, although the majority of silage corn is harvested in September. Concerns about moldy silage have caused farmers to become more conscientious about harvest prior to killing frost. High moisture ear corn is usually harvested between September and October but it is not unusual to see harvests into December on frozen ground. Silage corn is usually stored in bunker silos, upright silos, or bags. Fermentation additives are not uncommon, including acids, bacterial inoculant, and enzymes. High moisture ear corn is usually stored in oxygen limiting upright silos.

Insect Pests

INSECT	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
E.C.B.	Yearly			Broken leaf midribs. Sawdust like frass in the tassel. Tunnels in both stalks and ears. Holes in leaves.	Overwinters as an adult larva in field debris and ears stored in cribs. Moths lay flay white eggs on the underside of leaves in straight rows of 5 to 50. Eggs hatch several days later. Two generations may occur in June-	Generation 1: June-July Generation 2: Aug-Sept

					July and/or August-September.
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INSECT	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Corn Rootworm (Northern & Western)				<p>Corn plant roots will be dead and broken, goose necking may occur. Adult beetles will attack the plant tassels.</p>	<p>Eggs overwinter in field soil from late summer and hatch the following spring. Larva feed on the roots of corn plants exclusively. Larva are small, white, and elongate with a brown head and well developed mandible. Larva pupate in the soil. Adult beetles are a quarter of an inch long. NCRWs are tan to pale green while WCRWs are yellow with a black strip at wing cover sides. Beetles survive until the first hard frost.</p>	<p>Larva: Mid May-Mid June Adults: Mid July-Mid Sept.</p>

INSECT	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Armyworm				Ragged holes chewed in from leaf margins and pellet like frass in the leaf wholes and on the ground.	Larva will be found in leaf wholes and at the soils surface. Especially in no tillage corn with heavy weeds or fields from grains or grasses.	May
Cutworm				Missing, cut or wilted plants.	Adult moths lay eggs in weeds, to which they are attracted. More than one generation per year may occur. Larva are smooth, dull colored caterpillars 1-2 inches long when full grown and curl tightly when handled. They feed at night and hide in the soil during the day.	May

INSECT	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing

SeedCorn Maggot	Germinating seeds are killed or injured.	Adults are medium sized flies which remain through the growing season. Eggs are laid in moist soil cracks near seedlings or decaying matter as a food source. After hatching the maggot larva move through the soil.	Mid April - Early June
Wireworm/ Click Beetles	Larva feed on germinating seeds and/or the base of young plants.	Larva are long, smooth, hard-bodied and yellow to red brown. Typically a problem when corn follows sods.	Mid May - Mid June

INSECT	Trade Name	Chemical	% A.I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
E.C.B.	CURRENTLY NOT CONTROLLED BY PESTICIDES IN VERMONT									
Corn Rootworm (Northern & Western): Larval										

Lorsban	Chloropyrifos	15	Granular	Band or Furrow	8 ozs/1000 linear'
Dyfonate*	Fonofos*	15	Granular	Band	8 ozs/1000 linear'
Counter*	Tebufos*	4.63	Granular	Band or Furrow	8 ozs/1000 linear'
Force*	Tefluthrin*	1.5	Granular	Band or Furrow	8 ozs/1000 linear'

INSECT	Trade Name	Chemical	% A.I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
Armyworm										
	Sevin	Carbaryl	80		Soluble	Foliar	1.25-2.5 lbs/A			
	Lorsban	Chloropyrifos	44.9		Emulsifiable	Foliar	1-2 pts/A			
	Asana*	Esfenvalerate	8.4		E Conc.	Foliar	5.8-9.6 fl ozs/A			
	Pounce*	permethrin	38.4		E Conc.	Foliar	4 - 8 oz/A			
	Ambush*	permethrin	25		Wetable	Foliar	6.4 - 12.8 oz/A			
Cutworm										
	Sevin	Carbaryl	80		Soluble	Foliar	2.5 lb/A			
	Lorsban	Chloropyrifos	4		Emulsion	Foliar	2-3 pt/A			
	Asana*	Esfenvalerate	0.66		E Conc.	Foliar	5.8-9.6 fl oz/A			
	Pounce*	permethrin	38.4		E Conc.	Foliar	4 - 8 oz/A			
	Ambush*	permethrin	25		Wetable	Foliar	6.4 - 12.8 oz/A			

INSECT	Trade Name	Chemical	% A. I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
SeedCornMaggot										
	Agrox 2-Way	Captan +	37		Dust	Planter Box	2 oz/bu			
		Diazinon	25							
	BlueRibbon PII	Captan +	36		Dust	Planter Box	2 oz/bu			
		Diazinon	25							
	AgroxDL-Plus*	Captan +	14		Dust	Planter Box	1.8 oz/bu			
		Diazinon +	15							
		Lindane*	25							
	GerminatePlus*	Captan +	14		Dust	Planter Box	2 oz/bu			
		Diazinon +	15							
		Lindane*	25							
Wireworm / Click Beetles										
	Dyfonate*	Fonofos*	47.3		Emulsifion	Band	4 qt/A			
			15		Granula	Broadcast	40 lb/A			
	Counter*	Terbufos*	4.63		Granula	Furrow	8-16 ozs/1000 linear'			

INSECT	Alternatives	Cultural	Biological	Issues
E.C.B.	None Used	Clean Plowing	Resistant Hybrids	
Rootworm (Northern & Western)	None Required	Crop Rotation	None	
Armyworm	None	Crop Rotation. Eliminate field debris.	None	
Cutworm	None	Avoid Late Planning. Avoid Weed Infestations. Tillage.	None	
Maggot	None	Avoid Heavy Manure Spreading	None	

Wireworm/ Click Beetle	None	None	None
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Diseases

DISEASE	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Stalk and Ear Rots:						
fusarium			10-20% as a group	Whitish-pink/ salmon discoloration of pith, stalk breakage and pre-mature ripening. Similar to giberella.	Under warm wet conditions Fungi develop on crop residue in or on soil surfaces, then enter directly or at wound sites. May also be seedborn.	Apparent soon after pollination.
gibberella			10-20% as a group	Leaves wilt dull gray. Lower internodes soften and turn brown colors. Pith shreds and turns pink to reddish.	Under warm wet conditions Perithecia-mature windborn ascospores penetrate tissues.	Symptoms appear between silking and pollination. Conidia-fungus overseasons in maize debris and rarely as seed.

DISEASE	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing

diplodia		10-20% as a group	Plants die suddenly and injury resembles frost damage with gray color. White Fungal growth may be present on the surfaces. Pith discolors deep red and disintegrates leaving only intact vascular bundles. Lower internodes turn maroonish and spongy.	Under warm moist conditions, spores overseason, mycelium in seed are extruded and carried by wind, rain and probably insect. Infection occurs through crown, mesocotyl, roots and sometimes at crown ear nodes. Seedborn inoculum causes seedling blight. This pathogen grows only in the stalk.	Signs show several weeks after silking.
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DISEASE	V of Occurance	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Smuts:						
Ear Smut			0-10% (usually <2%)	Initially, galls are covered with a glistening greeneish-white to silver-white tissue. Gall interiors darken and turn to masses of powdery dark olive-brown to black spores, unless the galls appear on the	Dry conditions and temperatures 26 to 34 degrees C. Chlamyospores overwinter and germinate to produce sporidia carried by air currents or splashed by water to young tissues. Binucleate mycelium	Damage begins at ear and tassel formation.

			leaves. Mature galls may reach 15cm in diameter, while leaf galls will remain less than 1.2cm. Leaf galls will not rupture as will the others.	penetrate the host through stamata, wounds or cell walls causing host cells to proliferate.	
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DISEASE	V of Occurance	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Rust			< 1 %	Pustules (sori) may appear on all above ground parts with highest concentrations on the leaves. They are round or elliptical and golden to cinnamon. Found scattered over both leaf surfaces; pustules color will darken with maturity.	High relative humidity and temperatures of 16-23 degrees C. Spores are windblown into temperate zones from nearby tropical and subtropical areas.	July - September

DISEASE	V of Occurance	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Fungal Diseases:						

Eyespot	< 1 %	Lesions develop on green tissue in patchy zones. Initially lesions are water soaked, and later develop centers of light colors or are translucent, surrounded by dark brown rings which are framed by a yellow halo.	Cool humid conditions. Fungus overwinters in maize debris. Conidia germinate on then infect seedlings after transport by weather. The fungus may also be seedborn.	July - September
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DISEASE	V of Occurance	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Anthracnose			< 1 %	Leaf blade lesions are semitransparent. Oval spots may enlarge to 15mm and become tan at the center with borders yellow to red in color having a brown hue. Throughout the season symptoms progress up the plant. Coalescing lesions may blight the entire leaf.	Extended periods of clouds and high temperatures. Overwinters as spores and mucelium on seeds, or as saprophyte on maize crop residue in the fields. The fungus is spread by weather and infection occurs through leaf epidermis and stomata. Seedborn innoculum may cause blight on seedlings.	July - September

Rusts:	NO PESTICIDE TREATMENTS ARE CURRENTLY USED AGAINST SMUT DISEASE IN VERMONT
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DISEASE	Trade Name	Chemical	% A.I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
Fungal Diseases:										
Eyespot			NO PESTICIDE TREATMENTS ARE CURRENTLY USED AGAINST SMUT DISEASE IN VERMONT							

DISEASE	Alternatives	Cultural	Biological	Issues
Stalk and Ear Rots:				
fusarium	None	Lower plant populations. Balanced soil fertility. Avoid high Nitrogen levels. Avoid low Potasium levels.	Resistant Hybrids	
gibberella	None	Lower plant populations. Balanced soil fertility. Avoid high Nitrogen levels. Avoid low Potasium levels.	Resistant Hybrids	
diplodia	None	Lower plant populations. Balanced soil fertility. Avoid high Nitrogen levels. Avoid low Potasium levels.	Resistant Hybrids	

DISEASE	Alternatives	Cultural	Biological	Issues
Smuts:				
Ear Smut	None	Balanced soil fertility. Avoid high Nitrogen levels. Avoid heavy manure applications. Avoid mechanical injuries. Remove and burn galls prior to rupture.	Resistant Hybrids	
Rusts:				
Rust	None	Balanced soil fertility. Crop Rotation. Clean Plowing of crop residues.	Resistant Hybrids	

DISEASE	Alternatives	Cultural	Biological	Issues
Fungal Diseases:				
Eyespot	None	Balanced soil fertility. Crop Rotation. Clean Plowing of crop residues.	Resistant Hybrids	
Anthracnose	None	Balanced soil fertility. Crop Rotation. Clean Plowing of crop residues.	Resistant Hybrids	

Weeds

WEEDS	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Broadleaf Annual Weeds:						
Jimsonweed	Yearly	<1	<1	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
lambsquarter	Yearly	90	40	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
redrootpigweed	Yearly	80	40	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
commonragweed	Yearly	80	40	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
wild mustard	Yearly	40	10	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
burcucumber	Yearly	5	40	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
Annual Grass Weeds:						

crabgrass	Yearly	40	20	competition with maize	seeds and root stems	May - Mid June Sept. - Mid Oct.
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WEEDS	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
barneyardgrass	Yearly	30	20	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
witchgrass	Yearly	<5	<2	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
fallpanicum	Yearly	30	20	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
foxtails	Yearly	70	40	competition with maize	seeds	May - Mid June Sept. - Mid Oct.
Broadleaf Perennial Weed fieldbindweed	Yearly	<5	<2	competition with maize	seeds and creeping roots	May - July Sept. - Mid Oct.
Broadleaf Annual Weed velvetleaf	Yearly	40	40 - 60	competition with maize	seeds	May - July Sept. - Mid Oct.

WEEDS	V of Occurrence	% A Infested	Yield Losses	Damage	Lifecycle	Control Timing
Perennial Grass Weeds:						
yellownutsedge	Yearly	30	20	competition with maize	seeds and tubers	May - July, Sept. - Mid Oct.
johnsongrass	Yearly	<1	<1	competition with maize	seeds and tubers	May - July, Sept. - Mid Oct.
quackgrass	Yearly	40	20	competition with maize	seeds and rhizomes	May - July, Sept. - Mid Oct.

WEED	Trade Name	Chemical	% A.I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
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Broadleaf Annual Weeds:
Jimsonweed
lambquarter
redrootpigweed
commonragweed
wild mustard
burcucumber

See P.G.
W. and A.
G.W.

WEED	Trade Name	Chemical	% A. I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
Annual Grass Weeds:		See Also B.L. A.W.								
crabgrass, barnyard witchgrass	Lasso* or	Alachor* or	45.1		Flowable	Broadcast	2 - 2.25qts/A	preemergence		
fallpanicum	Micro-Tech* +	Alachor*	41.5		Liquid	Broadcast	2 - 2.25qts/A	preemergence		
foxtails	Atrazine*	Atrazine*	43		Liquid		1.25qts/A	preemergence		
	Sutan +	Carbamate*	85.1		Emulsion	Incorporate	4.75pts/A	pre-planting		
	Atrazine*	Atrazine*	43		Liquid		1qt/A			
	Bladex* +	Cyanazine*	90		D Flowable	Incorporate	2.25qts/A	preemergence		
	Atrazine*	Atrazine*	43		Liquid		1qt/A			
	Bicep Lite II*	Atrazine*	53.6		Liquid	Incorporate	2.4qts/A	preemergence		
	Bicep Lite II* +	Atrazine*	53.6		Liquid	Broadcast	2.4qts/A	preemergence		
	Princep	Simazine	41.9		Liquid		1qt/A			
	Prowl +	Pendmethaline	37.4		EmulsionC	Incorporate	3.6pts/A	preemergence		
	Atrazine*	Atrazine*	43		Liquid		1.25qts/A			

WEED	Trade Name	Chemical	% A. I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
Broadleaf Annual Weeds:										
fieldbindweed										
	Banvel	Dicamba	48.2		Soluble	Foliar	0.5pts/A	postemergence	2-3	seasons
	2,4,D									
velvetleaf										
	Prowl +	Pendimethaline	37.4		EmulsionC	Foliar	3.6pts/A	postemergence		
	Atrazine* +	Atrazine*	43		Liquid	Foliar	1.25qts/A			
	Bladex*	Cyanazine*	90		D Flowable	Foliar	2.2lbs/A			
	Buctril	Bromoxynil	33.4		EmulsionC	Foliar	1 - 1.5pts/A	postemergence		
	Banvel	Dicamba	48.2		Soluble	Foliar	0.5 - 1pts/A	postemergence		
	Banvel +	Dicamba	48.2		Soluble	Foliar	0.5pts/A	postemergence		
	Sencor		75		D Flowable		2ozs/A			
Perennial Grass Weeds		See Also A.G. W. and B.L.A. W.								

WEED	Trade Name	Chemical	% A.I.	% Crop Treat	Form	App. Type	App. Rate	App. Time	# Appls.	Days 2 Harvest
yellownutsedge										
johnsongrass										
	Laddok*	Bentazon*	27		Soluble	Foliar	2.3pts/A	postemergence		

Dual II +	Metolachlor	84.4	Emulsion	Incorporate	2 - 2.5pts/A	preplanting
Atrazine*	Atrazine*	43	Liquid		1.67qts/A	
Sutan +	Carbamate	85.1	Emulsion	Incorporate	4.75 - 7.3pts/A	preplanting
Atrazine*	Atrazine*	43	Liquid		1qt/A	

quackgrass

Roundup Ultra	Glyphosate	41	Liquid	Foliar	1 - 2qts/A	postemergence
Accent*	Nicosulfuron	75	S Powder	Foliar	0.67ozs/A	postemergence
Beacon*	Primisulfuron	75	Granule	Foliar	0.76ozs/A	postemergence

WEED	Alternatives	Cultural	Biological	Issues
Broadleaf Annual Weeds:				
Jimsonweed		Plowing & Fitting Cultivation	None	Poisonous Plant
lambsquarter		Plowing & Fitting Cultivation	None	
redrootpigweed		Plowing & Fitting Cultivation	None	
commonragweed		Plowing & Fitting Cultivation	None	
wild mustard		Plowing & Fitting Cultivation	None	
burcucumber		Plowing & Fitting Cultivation	None	Difficulty Harvesting When Established

WEED	Alternatives	Cultural	Biological	Issues
Annual Grass Weeds:				
crabgrass		Plowing & Fitting Cultivation	None	
barnyardgrass		Plowing & Fitting Cultivation	None	
witchgrass		Plowing & Fitting Cultivation	None	
fallpanicum		Plowing & Fitting Cultivation	None	
foxtails		Plowing & Fitting Cultivation	None	

WEED	Alternatives	Cultural	Biological	Issues
Broadleaf Perennial Weeds:				
fieldbindweed		Plowing & Fitting Cultivars	None	Spread By Tillage Activities, Difficulty Harvesting When Established.
Broadleaf Annual Weed				
velvetleaf		Plowing & Fitting Cultivation	None	

WEED	Alternatives	Cultural	Biological	Issues
Perennial Grass Weeds:				
yellownutsedge		Plowing & Fitting Cultivation	None	
johnsongrass		Plowing & Fitting Cultivation	None	
quackgrass		Plowing & Fitting Cultivation	None	

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