PEPPER

Production & Spray Guide

80TH ANNIVERSARY
SEED·CO
EST. 1940

Pepper Production Guide

"Integrated Crop Solution"

General

Peppers can be grown out doors but most pepper production is in Greenhouses under glass or plastic. Bell types have the largest share of the market. Fruits are large, blocky, three or four lobed, thick fleshed, nice dark green when immature turning either red, orange, yellow, and some black when fully ripe. Open pollinated and hybrid cultivars are available at Prime Seed. Hybrid F1 cultivars have combined resistance to several diseases. Hybrid seed is more expensive and gives bigger fruits and higher yields than open pollinated cultivars. As a Pepper plant grows and flowers, the growth of the plant is reduced while those fruits that have been set are filled to maturity. When these fruits have been harvested a new flush of growth takes place and the next lot of fruits are set. This process continues for as long as the plant is well cared for regards to nutrients and no disease or virus allowed to affect the plant. A pepper plant has a growth rate of about 25% slower than a tomato plant. Peppers have a slow production of leaf area as their leaves are much thicker and harder than tomatoes so have to expend more energy to produce the same leaf area. Because of the slow growth rate this makes peppers sensitive to any stress and are slow to recover. Successful and on-going production lies in a steady, regular growth rate throughout the life cycle. Avoid planting peppers in the same fields or greenhouses and tunnels previously planted with Tomato, Eggplant, Peppers or other Solanaceous crops as they share the same pest and disease problems. Peppers are generally self-pollinating. Planting time in important as there will be no pollination of flowers if the temperature is below 12° C. Fruit will set but there will be no seeds in the fruits. Good seed set is important to achieve a good yield.

Soil

Peppers like a PH range of 6.0 – 6.5. Soils can be from heavy loam to medium clay loam have a good structure, well aerated so good drainage can be achieved. Deep ripping to a depth of 40cm-45cm will allow for a good deep rooted crop as pepper plants are sensitive to excess water around the root system, but at the same time are susceptible to water stress.

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Fertilization

Basal:-

The main nutrient requirements are in a range of N 160-250kgs per hectare, P2O5 200-300kgs per hectare, K2O 200kg per hectare. This can be checked against the soil analysis done to decide on the rate of fertilizer to be applied to the crop. As a general rule a compound or blend

fertilizer can be used at a rate of 750kg – 1000kg per hectare of compound “B” or “C” depending on the soil analysis result.

Top Dressing:-

Two weeks after transplanting start top dressing with 35kg per hectare Calcium Nitrate for the first two top dressings then up to 45kg per hectare Calcium Nitrate every week till first harvest. Then apply Potassium Nitrate 30kg-40kg per hectare per week thereafter till two weeks before final harvest. Magnesium sulphate and Boron should be applied regularly after harvesting begins to prevent deficiencies. Ask your agronomist for advice on rates, or after sap test results. Blossom end rot can be caused by moisture stress, root damage or low PH. and a deficiency of Calcium. Blossom end rot is not only confined to the blossom end in peppers but can also occur on the sides of the fruits, often in combination with sun scorch.

Irrigation

Peppers do not like wet feet, but are very susceptible to water stress. The well prepared bed will help with drainage and encourage deep rooting. Irrigation requirements range from 600mm – 700mm. Peppers require a soil moisture content of around 80% of field capacity. Frequency of irrigation will depend on soil type. During the summer months soils need to be irrigated every 5 – 7 days and if drip irrigation is used normally every day of about 0.5lts. Drip irrigation is preferable to furrow irrigation or sprinkler systems. Overhead irrigation is not normally recommended for a pepper crop. Wet leaves and fruits promote disease development. If overhead sprinkler irrigation has to be used avoid irrigating towards evening and make sure plants are dry before night fall. With drip irrigation the salt concentration around the roots must be washed out from time to time.

Sufficient soil moisture should be maintained during fruiting which will promote large, more numerous fruits.

Growth & Development

The pepper plant grows upright with a single stem for 8 – 10 leaves. A “Y” shoot now forms and a flower bud forms in the split of the “Y”. As these two branches grow out they also develop into a “Y” form and a flower bud appears in the split of that “Y”. This pattern is repeated for about 5 nodes always splitting into two after the formation of a terminal flower. As the first fruits set they take all the energy from the plant inhibiting further growth, flowering and fruit set. Once the first fruits are harvested the energy is then channelled to new growth, flowers and fruits.

Agronomy

Peppers planted in the open fields can be transplanted into beds 30cm high with a top section of 1.2m – 1.5m wide. A soft seed bed with a fine texture will also promote active root growth. At transplanting plants are spaced 50cm apart and 50cm between the two rows on the top of the bed. This gives a population of approximately 26,600 plants per hectare. Beds can either be covered with grass mulch or wheat straw or thin plastic sheeting. Mulching helps to conserve moisture and reduce weeds. Plant populations in a greenhouse or tunnel can be from 22,000 – 25,000 plants per hectare. A normal method is to use a tram line system, planting staggered or off set double rows with a distance of 40cm – 60cm between plants. A pathway is left between the tram lines for easy access. This can be 40cm – 60cm. Plants in row can be 50cm – 60cm apart. A 60cm tram line with 60cm in row spacing with a one metre pathway gives a plant density of around 2 plants per square metre. The tram line system makes better use of available greenhouse space than single rows. Varieties must be well selected as this is vital for success. There are many factors to consider, this includes fruit type, colour, wall thickness and fruit size which will be best suited in the market place. A Prime Seed Agronomist can help with variety selection. Disease resistance is also of importance.

Seeding and Planting

Germination of Pepper seed needs optimum day temperatures of 24° C – 28° C with night temperatures 20° C – 21 °C. The minimum temperature a pepper seed will germinate is 13° C. Pepper seed may be seeded directly or in a well prepared seed bed or done as a speedling by a professional nursery. Prime Plants Nursery has the experience in production of excellent speedlings. As F1 hybrid seed is expensive the seed should be propagated as a speedling in 128 cell trays or 200 cell trays or in pots. The bigger the surface area of the cell or the pot the seedling will be thicker with a more sturdier stem. The ideal seedling should be 15cm – 18cm tall with 5 – 6 true leaves. If seedbeds are used a plant density of approximately 200 plants per square meter is optimal. Normally seedlings will be ready in about 60 days depending on temperature. Seedlings in seedbeds, trays or pots need to be hardened off well prior to transplanting. Just before pulling top dress with a balanced nutrient solution. If seedbeds are being done do not over water after sowing as lack of oxygen will inhibit germination. At transplanting, if the weather is very hot then transplant the seedling in the cool late afternoon or under cloud cover if any. This ensures that the transplanting shock of the seedling is minimised. Irrigate as soon as possible after transplanting.

In field peppers that are not pruned the normal fruit set is about 8 fruits per plant. If the weather permits a second, much later flush is possible after the first fruits have been harvested. By removing the first terminal flower and developing a stronger plant before setting the first fruit this will allow more splits and more regular fruit setting resulting in a rise of 10 – 15 more fruits. Some outdoor growers of F1 hybrid production can achieve yields of 80 – 90 tons per hectare from 25,000 plants.

Production in Greenhouse or tunnel structures makes space very expensive therefore growers must achieve the highest possible yields to pay for the structures. This means cropping for as long as possible from one planting and to avoid non-productive down time, maximising the yield potential from every plant and from every square metre of surface. Production in these structures normally produce the best quality. To achieve maximum yields one has to balance the crop yield with available leaf factory. For a pepper crop to re-establish its production it takes too long and can lead to big losses in income. A pruning program is aimed at suppressing early fruit set and promoting the establishment of a strong plant factory. By ensuring that all available energy goes into leaf and root growth, and thereafter maintaining equilibrium between leaf growth and fruit development. The grower must be able to manage all stages of fruit development on the plants, from a mature green or coloured fruit at the bottom of the plant, through all stages of green to an open flower and new flower development at the top of the plant.

It will also be necessary to prune side shoots until the start of flowering. When grown in Greenhouses and tunnels the plants are normally supported by strings attached to a cross member above the plants and the string wound around the stem to support it or by using individual stakes. Light shade cloth of 12% white will also promote bigger leaves, lowers temperature in hot climate areas and slightly reduce light intensities. All these factors promote growth and fruit set in peppers.

Harvesting

Tweet pepper fruits should be harvested when they reach full size and firmness. In general a good size fruit would weigh between 150grams – 180grams the fruit at this stage should have nice thick walls, be firm and the blossom end well formed. Sweet or Bell peppers should be large, blocky, 3 -4 lobed, sweet and thick fleshed. They are usually harvested before they begin changing colour, that is if it is to be sold as green fruits. One can pick the early green fruits to reduce the stress of the first load on the plant. Remove excess fruits as needed to stimulate regular bearing. Coloured fruits are picked before they have turned completely red or yellow because as they mature they become soft more quickly. Shelf life is shorter for fully coloured peppers compared to green peppers. When the peppers are about 75% coloured they are ready for harvesting. Stems of pepper plants are very fragile so use a sharp knife when harvesting. Be careful not to damage the plants. Do not pick if the exterior of the fruits are moist as this will encourage disease. Some stem MUST be left on the fruit.

Post-harvest, peppers should be stored at a temperature 8° C – 10 °C and RH of 90% - 95%. Under these ideal conditions you can store the harvested peppers for up to three weeks.

Temperature control is important as below 5 °C they will suffer chilling injury though from 7° C and above they will continue to ripen.
The time scale from planting to production may vary from 80 – 90 days in warm weather conditions and from 110 - 120 days in cool weather conditions. The harvesting period varies between 10 – 12 weeks depending on how well pests and diseases are controlled.

Pepper Spray Guide

Stage	Nursery	Transplanting	Vegetative	First flowers	First Fruits	Mature
Days:	0 - 35	28-36	30-60	60-65	65-70	+75
Pest Problems						
Nematodes		Solvigo				
Soil Pests & Aphids		Actara Soil drench				
Cutworms		Karate Zeon				
Fruitworm & Caterpillars				Ampligo / Match / karate Zeon / Proclaim		
Aphids & Red Spider Mite				Polo / Actara / Dynamec		
Disease Problems						
Damping off	Apron Star / Maxim					
Bacteria spot & rot			Bion / Copper Oxychloride			
Cercospora (Frogeye)			Amistar Top / Ortiva			
Anthracnose				Bravo / Amistar Top		
Powdery mildew			Amistar Top			
Phytophthora rootcrown				Ridomil Gold MZ / Folio Gold / Revus		
Virus complex		Actara / Ortiva				
Weed Problems	Below are off-labe suggestions; grower must do own tests for crop damage.					
Before planting - post emergence perennials	Touchdown					
Before planting - post emergence annuals	Gramoxone / Touchdown					
Pre-emergence: grasses		Dual Magnum				
Post-emergence: grasses			Fusilade Forte			
Pre-emergence: grasses + Broadleaf			Codal Gold			

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SEED CO GROWER'S GUIDE

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CROP	DAYS TO MATURITY		PLANT SPACING (cm)		PLANTS/HA X1000	AVERAGE SEED PER GRAM	SEED REQUIREMENT (Kg/Ha)	COMMON PESTS	COMMON DISEASES
	WARM	COOL	IN ROW	BETWEEN					
Garden Beans	55	65	2x7*	50	285	4-5	75	Bollworm	Rust Anthracnose Halo Blight
Beetroot	80	110	10*	20	450	50-60	8	Aphids	*Ccpa* *Rzoct*
Broccoli	70	90	40	70	36	225	0.2	Diamondback Moth Aphids	Black Rot White Blister
Butternut	90	120	50	100	20	8-10	3	Fruit Fly	Gummy Stem Blight Anthracnose
Cabbage	80	110	40	50	30	300	0.2	Diamondback Moth Aphids	Black Rot Club-root *S*
Carrot	90	120	3*	15	1100	800	2	Nematodes	*ta*
Cauliflower	85	110	40	70	36	240	0.2	Diamondback Moth Aphids	Black Rot Club-root
Cucumber Field	60	85	40	150	16	40	16 000 Seeds	Red Spidermite Aphids Whitefly	*Fm* Powdery Mildew Downy Mildew
Cucumber Tunnel	65	85	45	150	16	40	3 per m²	Red Spidermite Aphids Whitefly	*Fm* Powdery Mildew Downy Mildew
Eggplant	75	90	50	75	27	220	0.15	Thrips Aphids	Powdery Mildew
Gem Squash Semi- bush	50	70	35	150	18-22	10-12	4	Pumpkin Fly	Powdery Mildew
Gem Squash Vine	55	80	50	150	14	10-12	2	Aphids	Virus Diseases
Hubbard Squash	110	130	100	150	7	6	1.5	Pumpkin Fly Aphids	Powdery Mildew
Lettuce	50	70	30	60	55	800-1000	0.05-0.07	Aphids Leafminer	Powdery Mildew Bacterial Rot
Marrows	35	55	40	150	18	8-10	2.5	Fruit Fly Whitefly	Virus Diseases Powdery Mildew
Melon	85	100	40	150	16	20	1	Fruit Fly	Anthracnose Fusarium Root Rot
Onions	170	190	8*	20	850-1000	250	3.5	Thrips	White Bulb Rot Pink Root Rot *ta*
Peppers	70	85	2x40*	150	30-35	150	0.25	Aphids Thrips	Virus Diseases Phytophthora Root Rot
Pumpkin Semi-bush	90	120	80	180	8	4	2	Pumpkin Fly Cutworm	Powdery Mildew Fruit Rots
Pumpkin Vine	120	140	100	180	5	4	1.5	Pumpkin Fly Cutworm	Powdery Mildew Fruit Rots
Sweet corn	75	100	20	90	55	8	8	Stalk Borer Bollworm	Rust NCLB
Swiss chard	60	75	20*	45	200	60	4-6	Aphids	*Ccpa*
Tomato	80	100	40	150	16	250	0.1	Bollworm Whitefly Nematodes	Blight Bacterial Wilt Viruses
Watermelon	80	90	50	180	6	20	0.3	Fruit Fly	Gummy Stem Blight Anthracnose

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