ONION

Production & Spray Guide

80TH ANNIVERSARY
SEED·CO
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Onion Production Guide

"Integrated Crop Solution"

General

Onions require cool conditions for good vegetative growth with a temperature range of between 12° C and 24 °C. In Zimbabwe generally the winter months provide these conditions as the long cool winter months gives better vegetative growth before bulbing, resulting in better and higher yields. As the summer months approach and high daily temperatures of 25° C to 27° C accelerates the bulbing process. If a cold snap occurs with temperatures of around 13°C while bulbing this can trigger bolting. The bulbs need a month of dry weather towards the end of its growing period for maturity. Onions are sensitive to length of daylight. Certain cultivars like "Texas Grano" an open pollinated variety have fairly short daylight requirements that is why they are termed short day cultivars. The most popular Hybrid varieties grown in Zimbabwe are sold by Prime Seed and they are San F1. Cultivars that are able to form bulbs in less than a 12 hour day length must be grown. Late or indeterminate day cultivars require longer day length, therefore should not be planted above the 28 Degree latitude, as the closer to the equator the shorter the day length. Zimbabwe lies roughly between 16 Degree- 23 Degree south of the equator therefore gives best results to short day cultivars. Choice of cultivar is determined whether long term storage is required or not. Hybrids will store for up to 5 – 6 months whereas open pollinated varieties do not have good storage properties. As onions remain in the ground for a long time weed control is very important because the soil should not be worked deeper than 50mm to 75mm then only during the early growth. Leaf disease control is also very important.

Site & Soil Selection

Onions have a relatively shallow root system to a depth of about 200mm to 300mm. Onions can be grown on a wide range of soils. Heavy clay soils however are difficult to work with and can cause serious problems at harvest. Soils prone to capping i.e. T factor should be avoided. Onions respond to well composted kraal manure at a rate of up to 20 tons per hectare which has been incorporated into the soil. Soil PH of 5.5 – 6.5 is optimum as at a low PH; certain diseases like White Rot become more prevalent. Soil analysis is important and needs to be done for fertilizer application and to understand the Cation balance e.g. Ca:Mg:K:Na ratio should be 65%:23%:10%:2%.

Soils should be deep ripped to achieve good drainage, with a good fine to medium seedbed tilth with no large clods. If direct seeding with a specialised planter a nice level fine tilth will be needed.

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Fertilization

Soil analysis will help to decide how much fertilizer to apply. Onions generally do well with 1,000kg to 1,300kg of compound “C” (6:17:15) Calcium nitrate can be used as a top dressing at the rate of 30kg per hectare starting at 3 weeks after transplanting or emergence. Another top dressing at 5 weeks, 7 weeks and 9 weeks up until seventh or eighth leaf stage. Micro nutrient sprays of Nutrifoil 2 every 2 weeks at the rate on the label should be done until the bulb starts to form. Avoid late or excessive Nitrogen top dressings as this will cause “Bull necks”, it will also cause the plant to go back to vegetative mode if Nitrogen levels are high at bulb formation.

Production Methods

Onions can be produced in the following way :-

a) Production of seedlings in an open field seedbed for transplanting.
b) Doing seedlings in trays with up to 3 or 4 seeds per plug. Prime Plants Nursery have the expertise to do this.
c) Seeding direct in the field with a precision planter.
d) Onion sets for transplanting.

Field Seedbeds

A common method used. Sowing is done from early February to mid-April for transplanting from May to June. Harvesting is then normally done from September to mid-October. Seed is sown in rows 150mm – 200mm apart and seed sown to a depth of 10mm to 12mm. About 7 grams to 10 grams seed is used per square metre. Allow 3kg to 5kg of seed to produce 600,000 seedlings to be planted per hectare. Transplant seedlings when pencil thick about 6 – 8 weeks after sowing.

Seed Trays

Sowing time similar to open seedbeds. Seedlings normally only get to 3.0mm to 3.5mm in diameter. Once the plug is pulled separate the seedlings and plant individual plants. Some growers plant the plug without separating the seedlings but at slightly wider spacing. This is not normally suggested as these clusters do not develop sufficiently and some bulbs are malformed with flattened sides.

Transplanting seedlings from field seedbeds or plugs.

Seedlings are planted in shallow furrows which have been made on top of the bed. The number of rows will depend on variety and the growers decided final population. Roughly 5 to 6 rows on a 1,2metre bed top is the normal. Seedlings are placed at a slant on the sides of the furrow and the roots are covered with soils to a depth of 1cm to 2.5cm. After transplanting, the seedlings will lie flat but will recover in a few days after the settling in irrigations and will start growing upright.

Direct Seeding

Direct seeded crops are normally 6 weeks earlier to maturity and avoids the labour- intensive practice of transplanting. A big disadvantage is that the entire field has to be kept weed free, seedlings are still very small, weak and vulnerable. Weed control pre and post emergence is very important. Irrigation is a problem as it needs to apply small amounts often and evenly over the entire crop until germination is complete. Seed requirement is between 6kg to 8kg per hectare.

Production Methods

Sets are more robust after they have been transplanted and therefore easier to manage. Seed is sown in an open field nursery on beds that are 1.2metre to 1.6metre on top with 6 or 8 rows per bed 20cm apart this figuration depends on if a planter is being used or being done by hand. Seeding is normally done in June in the hotter parts of the country and July – August in the cooler areas as a general rule of thumb one hectare of seedbeds should supply enough seedlings for 10 hectares of crop. It is very important that not too much Nitrogen is given to the growing seedlings. Approximately 30kg – 50kgs of Nitrogen needs to be applied per hectare. After germination the bulbs will start to form within 4 – 6 weeks. Bulbs will continue to grow until November when their size gets to 20mm – 25mm in diameter, then will begin to lodge. Lifting will be done in late November to Mid-December. After the sets have been lifted allow the necks to start drying off for 2 – 3 days then the sets can now be dried in bulk bins, on wire racks or cages. Make sure that the necks of the sets are completely dry before storage.

It is important that the storage facilities are adequate to hold all the sets as they need to be kept for between 2 – 3 months before planting out. Before storage, sets can be graded into roughly 3 sizes, 15mm – 20mm – 25mm so immature and over size bulbs can then be discarded so they do not take up storage space. If sets are stored in bulk do not go higher than 1metre – 1.5 metre in the drying room. There are two methods of storage, either cold or warm. Cold storage needs temperature range from 1° C to 4° C with a R.H of 65% - 75%. Warm storage has a temperature of 26 °C – 27° C with a R.H. of 60% - 75%. Sets can be stacked on a slatted or perforated floor so that an air flow can then pass through. There are problems with cold and warm storage. High temperatures can result in slow emergence after planting out the sets due to the lack of the breakdown of the inhibitor (diallyl-dislulfide) which is formed in the sets during the latter stages of growth. After planting out frequent light irrigation of 1mm to 2mm can be applied twice a day to help cool the soil down. Warm storage is best for sets larger than 25mm, as large sets are prone to bolting with cold storage conditions. Cold storage can lead to unwanted flowering if sets are kept for the whole period of storage. The inhibitor is broken down by cold storage. Before storage contact your Prime Seed Agronomist to recommend a fungicide to prevent disease and decay during storage and how best to apply it. Remember to dry the bulbs again if dipped in a chemical solution.

Make sure at transplanting time that the sets must be completely covered with soil as any part left exposed will probably get sun scorched resulting in possible pathogen attack. After transplanting out the sets the smaller size sets just start enlarging in size and begin to become normal onions. Large sets over 35mm in diameter often split. The idea of using sets is to get a crop to mature earlier than the normal plantings thereby catching higher prices on the market. However this method does result in a rather uneven crop. The percentage of bolters, thick neck bulbs and split bulbs is often quite high. Spacing of the sets in the field is the same as for planted out seedlings or direct seeded crops. Planting is done by hand or a specially designed planting machine.

Spacing

Plant density can be from 600,000 to 800,000 plants per hectare. Seed count is normally 270,000 seeds per kilo.

Plant on beds of 1.2m – 1.6m beds centre to centre. Five to eight rows per bed 20cm apart and seedlings or seeds 5cm to 10cm apart. Planting depth is critical as this has a noticeable effect on the bulb shape. The onion stem plate forms at the point that the seed germinates. The entire bulb forms above this point thus the bulb may form below or above the soil surface depending on the placement of the seed.

Irrigation

After sowing the seed direct in the field or in the field nursery seedbed the soil surface should not be allowed to dry out. This entails short irrigation cycles two to three times a day depending on weather conditions. After transplanting seedlings they should be watered daily until the plants stand up. Onion roots can penetrate up to 800mm but most roots feed in the top 200mm – 300mm of soil. Care of irrigation management in the first 9 – 10 weeks is important, before bulb formation and the next important period is just before harvest. No stress should be allowed during bulb formation however no irrigation should be applied for the final 3 weeks before maturity to allow the bulbs to cure properly. A good onion crop will require 600mm – 700mm of irrigation.

Harvesting

Some growers harvest a small portion of the crop once the bulbs are a good size and sold as green onions tied in bunches. This is normally sold to local vendors. Mostly growers start harvesting when the tops of over 50% of the crop have collapsed and fallen over, even though the leaves still show a green colour. A good way to lift is to loosen the soil with a blade pulled below the root zone. Leave the onions for 3 – 4 days to dry then pull them out by hand. Even if the crop is not going to be stored, the bulbs should be dry before marketing. Pull up to about 10 rows at a time and place in a single windrow in the field with the leaves being put over the bulbs to stop sun burn.

These are left for a further 2 – 3 days to dry and then the roots and leaves are cut off. If rain should fall before the onions have been removed from the field the windrows should be turned over and opened up to dry before re doing the windrow. Once off the field and in the shed onions can be graded to size before pocketing for marketing. If onions are to be stored the keeping quality is related to the amount of cells per volume of the bulb, the amount of growth inhibitor (diallyl disulphide) is formed in the leaves then translocate to the bulb at maturity. Make sure the onions have lodged properly for this process to take place so as to enhance the keeping quality.

Effective drying is when the temperature is around 27° C and low humidity of 75% R.H. with good ventilation. This temperature also reduces sprouting in the stored onion. Where long term storage is required it is important that high relative humidity of 75% - 80% R.H. are avoided as this is the enemy of stored Onions, promotes root growth and the development of storage Pathogens that could result in big losses. Low relative humidity of less than 65% R.H. leads to excessive moisture loss resulting in shrivelled bulbs and big losses in weight. For long term storage good management of the shed is vital. Before filling the shed it should have been cleaned thoroughly to prevent fungal and bacterial infections. All damaged onions should be removed at grading before coming into the building. Good ventilation, temperature control and humidity control of all the bins should be checked regularly, and any onions with Basal, Neck and Soft Rots which are common storage problems must be removed. Keep the floor clean of debris and sweepings.

A well cured onion will store and remain in a good state for a long time.

Onion Spray Guide

Stage	Nursery	Transplanting & seeding establishment	Vegetative	First blubs	Blub expansion	Mature
Days:	0 - 49	42 - 56	50- 90	90 - 110	110 - 170	150 -200
Pest Problems						
Nematodes	Solvigo					
Soil Pests		Actara Soil drench				
Cutworms		Karate Zeon				
Thrips		Actara / Ampligo				
Disease Problems						
Damping off	Apron Star Seed Dress					
Downy mildew & white tip		Ortiva/Ridomil/Foilo Gold/Revus				
Purple blotch (alternaria)		Amistar Top / Bravo				
Neck Rot			Amistar Top / 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- transplanting ; pre-emergence: grasses + broadleaf			Fusilade Forte			
Pre-emergence: grasses + Broadleaf		Servian				

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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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