Fruits and Vegetables

1. Broccoli
2. Cabbage
3. Cantaloupe
4. Carrot
5. Cauliflower
6. Celery
7. Corn
8. Cucumber
9. Hot Pepper
10. Lettuce
11. Parsley
12. Passion fruit
13. Pineapple
14. Pumpkin
15. Salad Beans
16. Sweet Peppers
17. Tomato
18. Watermelon

TECHNOLOGY PACKS

CORN

November 2015

Background

Production decisions concerning how much effort and resources to invest and which farming practices to follow, have consequences and create opportunities for the farm affecting production levels, input costs, time constraints, and the potentially size of the operation. They also may have implications for resource use and environmental quality.

Numerous information exist on the various aspects of production and handling/ marketing of crops and livestock, the majority of which are outdated, not easily understood and lacking the where with all for addressing present day challenges such as good agricultural practices (GAPs) and food safety and climate change that impact on the environment and rural livelihoods. These issues are also closely related to the importance of the role of primary producers in increasing the earnings of all actors along the value chain in supporting the development of a commercially viable and sustainable agricultural industry.

The production of high quality and easily understood information packages is critical as this forms a basis for farmers to obtain financing from lending institutions and to efficiently increase their production through the availability of modern technology. This will also result in a reduction of rural unemployment and will greatly help in alleviating poverty and other associated social ills.

TECHNOLOGY PACKS

CORN

November 2015

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Introduction

This Technological Package (Tech Pack) deals with the production and postharvest aspects of corn.

Also included in the Tech Pack are appendices:

- Template for cost of production
- List of recommended pesticides and application rates
- Good Agricultural Practices data record sheet.

Notwithstanding the identification of any specific pesticide for the control of pests and diseases, this decision is for the discretion of the Ministry of Agriculture Area Extension Officer and the farmer.

However, the mention of any pesticides and other products used in the Tech Pack should strictly comply with local regulations and all instructions provided by the manufacturer. Also, the use of trade names in the Tech Pack is for the purpose of citing examples and is not meant to either endorse or discredit any particular product.

Botanical Description

Corn (Zea mays) belongs to the family Poaceae. The local name in Creole is Mi. It is high-energy food, a rich source of vitamins A, B, E and many minerals. It also has high fiber content.

Ecology and Environment

Corn is an extremely versatile crop. Although it is grown mainly in wet, hot climates, it can thrive in cold, hot, dry or wet conditions.

Varieties/Cultivars

Main varieties are Pioneer, Decalb, and Honey Jean II.

Land Preparation

Plough and rotavate land at least 6 inches (15 cm) deep. Before rotavating the land, broadcast 150 - 200 lb/acre (170 - 225 kg/ha) of Sulphate of

Ammonia. On flat land establish drains spaced 30 - 40 feet (9 - 12 m) apart to remove excess water. On sloping land establish drains on the contour 30 - 40 feet (9 - 12 m) apart. Form ridges 3 feet (90 cm) apart (Plate 1).

Plate 1 Land preparation for planting cor

Spacing and Planting

The crop is established by direct seeding, as it does not perform well when transplanted as seedlings. Seeds can be planted by hand in rows spaced 36 inches (90 cm) apart and 10 - 12 inches (25 - 30 cm) apart along the row. Plant two seeds per hole and thin to a single plant 10 - 14 days after germination giving a plant population of 15,000 - 20,000/acre (17,000 - 22,500 kg/ha). Plant seeds not more than 2 inches (5 cm) deep.

Irrigation

Irrigation water, especially from streams and ponds, should be sent for analysis to ensure that the water is not polluted or saline. It must be of good quality for irrigation.

The frequency and amount of irrigation depends on the growth stage of the corn, the amount of water the soil can hold around the root zone (soil type) and the prevailing weather conditions. The most important time period for irrigation is from 2 weeks before tasselling until harvest. Establish a drip irrigation system as a means for applying supplemental water particularly in the dry season and on sandy soils where frequent watering is required for optimum crop production.

Plate 2 Drip irrigation in corn

Fertilization

Specific kinds and rates of fertilizers must be determined from the results of soil and leaf analyses. Composted manure if available should be applied to the soil to help with the uptake of nutrients from inorganic fertilizers; it adds organic matter to the soil, enhances soil structure and growth of micro-organisms. All manure should be well composted to ensure that harmful microorganisms and weed seeds are destroyed.

During the rainy season before rotavating, or at planting time during the dry season, 150 - 200 lb/acre (170 - 225 kg/ha) of Sulphate of Ammonia should be applied by broadcasting, before rotavating or at planting time, by placing in rows 6 inches (15 cm) to the side of the plants and 4 inches (10 cm) below the soil surface.

Apply 100 - 200 lb/acre (110 to 220 kg/ha) of NPK fertilizer at a ratio of 1:1:1 or 2:1:1 as a split application, first when plants have 8 - 10 leaves and second when first silks appear.

Weed Control

An integrated approach, which includes cultural, mechanical and chemical measures, should be adopted in the control of weeds in production of corn. Can apply Atrazine 80 (Gesaprim) at 1¼ -1½ lb/acre (1.4 to 1.6 kg/ha).

Pests and Diseases

The major pests and diseases, symptoms and control/management affecting corn are indicated in Table 1.

Table 1 Causal agents, symptoms and control of pests and diseases of corn

Pest & Diseases	Symptoms	Control/ Management
Plate 3 Corn Earworm	The caterpillar is broadly striped; up to 1 inch (2.5 cm) long; and yellow, green, or brownish. The adult moth is yellowish, with brown markings and a 1 – 1½ inch (2.5 – 4 cm) wingspan. The caterpillar feeds on the tip of sweet corn ears, leaving a mass of brown faecal matter.	Apply contact and systemic insecticides.
Plate 4 Army Worm	The first symptoms will be ragged feeding on the top leaves with wet, brown faeces in the area. The larva usually can be found hiding well down in the whorl or at ground level under clumps of grass.	Apply contact and systemic insecticides.

Pest & Diseases	Symptoms	Control/ Management
Plate 5 Aphids	Aphids cause damage by sucking plant sap, which causes heavily infested leaves to curl and stunts plants.	Apply contact and systemic insecticides.
Plate 6 Cut Worm	When they feed Cut Worm cuts down the young plants/seedlings, and are capable of destroying an entire field.	Use a contact or soil insecticide around the base of the plants.
Plate 7 Corn Smut (Galls) caused by a fungus *Ustilago maydis*	The disease is characterized by the presence of large fleshy irregular galls on the leaf, stem ears and tassels. Immature galls are white and spongy; mature galls turn brown and contain dark powdery spores.	It is uneconomical to control this disease. Plant resistant varieties and practice crop rotation.
Plate 8 Anthracnose Stalk Rot causal organism is *Colletotrichum graminicola*	Anthracnose Stalk Rot is characterized by high stalk lodging. Black to tan lesions on the plant, and black specks (spores) on the plant making it appear black or dirty to the eye.	It is uneconomical to control this disease. Plant resistant varieties and practice crop rotation.

Pest & Diseases	Symptoms	Control/ Management
Plate 9 Grey Leaf Spots caused by two types of fungi *Cercospora zeae-maydis and Cercospora zeina*	Symptoms seen on corn include leaf lesions, discoloration (chlorosis) and foliar blight.	The disease can be managed using resistant varieties, crop rotation, removal of crop residues, use of fungicide and weed control.

Sweet corn should be harvested at the milk stage; the silks are brown and dry at the ear tip. When punctured, the soft kernels produce a milky juice. Over-mature sweet corn is hard. An immature ear will not be completely filled to the tip and the kernels produce a clear, watery liquid when punctured.

The date for harvesting can be estimated by noting the date of silk emergence. The number of days from silk emergence to harvest is approximately 18 - 23 days. Most hybrid sweet corn varieties produce two ears per plant. The upper ear usually matures 1 - 2 days before the lower ear. Ears can be harvested over a 5 - 7 day period. To harvest, grasp the ear, snap downward while twisting the ear. Harvest corn early in the morning and hold in the shade during the hot part of the day. For the best quality and flavour use corn immediately after harvesting.

Harvesting/Maturity

Harvesting sweet corn at the proper stage of maturity is important to insure a high quality crop. Sweet corn should be harvested at the milk stage. At this stage the silks are brown and dry at the ear tip. When punctured, the soft kernels produce a milky juice. Over- mature sweet corn is hard. An immature ear will not be completely filled to the tip and the kernels produce a clear, watery liquid when punctured.

The date for harvesting can be estimated by noting the date of silk emergence. The number of days from silk emergence to harvest is approximately 18 to 23 days. Most hybrid sweet corn varieties produce two ears per plant. The upper ear usually matures one or two days before the lower ear. Ears can be harvested over a 5-7 day period. To harvest, grasp the ear, snap downward while twisting the ear. To obtain the best quality and flavor corn should be harvested and use immediately. Harvest corn as early in the morning and keep it in the shade during the hot part of the day

Field Handling

Place harvested ears in well-ventilated field crates (Plate10).

Plate 10 Harvested corn

Preparation for Market

Do not husk until ready for use. Remove harvested ears from the field to a shaded area as soon as possible. Discard ears that are over mature, immature or infested by insects.

Yields

Yields can vary from 15,000 - 20,000 lb/acre (17,000 - 22,500kg/ha).

Storage

Rapid removal of field heat and continuous and proper refrigeration are essential to the maintenance of sweet corn quality. Corn should be stored in cool temperatures, usually around 35ºF (1.5ºC) and 95-98% relative humidity, the cooler the better. If corn is not stored quickly in these conditions, the flavor will change as sugars in the kernels will rapidly begin to convert to starch.

APPENDICES

APPENDIX I: TEMPLATE FOR COST OF PRODUCTION ANALYSIS: CORN

	Input	Quantity	Units	Unit Cost	Total Cost
1.	**Land preparation and planting**				
	Sulphate of ammonia				
	Seeds				
	Other land preparation costs (e.g. equipment rental)				
	Total cost for land preparation and planting				
2.	**Crop maintenance**				
	Water/irrigation				
	Fertilizer (specify types used)				
	Weed control (specify chemicals etc used)				
	Pest and disease control (specify chemicals etc. used)				
	Total cost for crop maintenance				
3.	**Harvest/storage**				
	Crates				
	Estimate any utility costs				
	Transport to market				
	Total cost for harvest/storage				
4.	**Labour**				
	Land preparation and planting				
	Crop maintenance				
	Harvest/storage				
	Total cost for labour				
5.	**Rent/insurance**				
6.	**Miscellaneous costs**				
	Total cost of production				

1. It is recommended that the above data be completed on a per crop basis.

2. The cost of any fixed structures should be considered. For example if a refrigerator is solely used to store corn in the year and is expected to last for 10 years, then one tenth of the cost of purchase should be added at item 6. If, however other crops are also stored then these also need to be considered. If corn accounts for half the produce stored in a year, then the annual cost calculated as above needs to be divided by 2. Similar considerations should be given to an irrigation system.

3. The revenue obtained from sale of the crop should be compared with the cost of production to determine the profit/loss on the operation.

APPENDIX II: LIST OF RECOMMENDED PESTICIDES AND APPLICATION RATES

INSECTICIDES	APPLICATION RATE
Pronto 35 SC	3 - 5 teaspoons/gallon of water
Target	1 - 2 teaspoons/gallon of water
Pirate	½ - 1 teaspoons/gallon of water
Fastac	1 - 2 teaspoons/gallon of water
Caprid	½ - 1 teaspoon/gallon of water
Diazinon (Basudin)	¾ - 1½ pints/acre
Admiral	¼ teaspoon/gallon of water
Dipel	1½ - 2 teaspoons/gallon of water
Aza-direct	1 - 2 teaspoons/gallon of water
Cure	½ - 1 teaspoon/gallon of water
Danitol	1 - 2 teaspoons/gallon of water
Cypro	½ tablespoon/gallon of water
Dimethoate (Perfecthion, Rogor 40)	1 pint/acre
Phosvel	1¼ - 2 pints/acre
Orthene	3.2 ounces/acre
Permethrin (Ambush)	½ teaspoon/gallon of water
Padan 50 WSP	2 - 3 teaspoons/gallon of water
Lannate	1 teaspoon/gallon of water
Decis	½ teaspoon/gallon of water
Kelthane 42%	1¼ lb/acre
Orthene 75S	1 lb/acre
Malathion	½ - 1 pint/acre
Sevin	1½ lb/acre
BT (*Bacillus thruingiensis*)	Label rates
Rotenone	1 - 2 teaspoons/gallon of water
Neem X.	8 - 10 oz/gallon of water
FUNGICIDES	**APPLICATION RATE**
Bellis	2 teaspoon/gallon of water
Acrobat	2 - 4 teaspoon/gallon of water
Mancozeb (Dithane M45)	1.5 lb/acre
Cabendazim	2 teaspoon/gallon of water
Daconil	1½ - 2 pints/acre
Benomyl (Benlate)	6 oz/acre
Captan	2 - 3 teaspoons/gallon of water
Peltar	3 teaspoons/gallon of water
Manzate DF	2 - 4 teaspoons/gallon of water
Bravo	1½ - 2 pints/acre
Tri-Miltox-Forte	3 teaspoons/gallon of water
Botrilex	5 - 200 lb/acre
Kocide 101	2 - 4 teaspoons/gallon of water
Cupravit	2½ lb/acre

APPENDIX II: LIST OF RECOMMENDED PESTICIDES AND APPLICATION RATES

WEEDICIDES	APPLICATION RATE
DCPA (Dacthal W-75)	10 lb/acre
Diphenamide	4 - 10 lb/acre
Paraquat (Gramoxone)	1 - 2 pints/acre
Dymid 80W	5 lb/acre
Atrazine 80 (Gesaprim).	1¼ - 1½ lb/acre
Linuron (Lorox)	1 pint/acre
Prometryn (Caparol)	0.8 - 1.6 lb/acre
Sethoxydim (Poast)	1¼ - 3½ lb/acre
Clethodim (Select)	0.094 - 0.25 lb/acre
Prometryn 50WP (Geagard)	2 - 3 lb/acre
Herbicidal Oil (Stoddard Solvent, Kerosene oil)	40 - 80 gallons/acre

APPENDIX III: GOOD AGRICULTURAL PRACTICES DATA RECORD SHEET

Grower name:

*Name of applicator	Date	Brand and product name	Rate	Size of area/no. of plants treated	Total application (amount of the product used)	Notes/target pest	Start/finish time

*The applicator should be trained or, if not, supervised by a trained or certified person. Proof of training required.