FLORIDA AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF FLORIDA
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES

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Vegetable Crops Department

VEGETARIAN

George A. Marlowe, Jr.
Chairman

James Montelaro
Vegetable Crops Specialist

Mason E. Marvel
Associate Vegetable Crops Specialist

James M. Stephens
Assistant Vegetable Crops Specialist

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TO: COUNTY AGRICULTURAL AGENTS

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1. Drop in pH from Summer to Winter

Vegetable growers in Florida should be aware of a possible drop in soil pH from summer or early fall to winter. If this possibility is not taken into consideration, the result can be costly to the producer. In most cases, the drop in pH is quite small—ranging only from 0.1 to 0.3 units. However, the drop can be considerably more under certain conditions. A change of up to 0.8 of a unit has been observed on many occasions on both sandy and organic soils.

The problem that develops following such a change is simply an imbalance in nutrition. Quite often, a deficiency of one or more of the minor elements becomes evident. The problem is considerably harder to solve during the growth of the crop than it would be if measures were taken before the crop is planted.

Soil scientists explain the drop in soil pH on the basis of: (1) a reduction of the active lime, (2) production of acids and (3) a change in the colloidal complex resulting from the decomposition of humus in the soil.

To compensate for a drop in pH, a soil can be limed slightly heavier than normal providing that the amount of minor element applied is also increased. Another alternative is the use of base-forming or low-acid forming fertilizer materials. Calcium nitrate is an example of a base-forming fertilizer source. On the opposite end of the scale is ammonium sulfate—an acid forming material.

2. Use of Low Salt Index Fertilizers in Vegetable Production

Vegetable crops in many of the more important production areas in Florida are subject to injury from excessive soluble salts on occasions. This is especially true where growers use large amounts of fertilizers together with irrigation water that is high in soluble salts. The problem is most severe following droughty periods. Growers should be aware of this potential problem and make every effort possible to keep soluble salts to a minimum consistent with good, economical production practices.

One practice that is not being used to the fullest extent is to keep total soluble salts down in vegetable production by the use of "low salt-index fertilizer materials."* They can be used to formulate the primary fertilizer application used before, during or after seeding or transplanting. They can also be used as sources for sidedressing materials. Low salt-index materials do not increase the cost of fertilizer significantly.

This is clearly pointed out in the tables that follow which were prepared by Dr. D. R. Hensel, Soils Chemist in Charge, Potato Investigations Laboratory, Hastings, Florida. They are reprinted here with Dr. Hensel's permission. The information was presented at grower meetings held at Hastings and Bunnell, Florida, where salt problems are quite common. The information in these tables should be carefully studied by everyone involved in the fertilization of vegetable crops in Florida.

*Salt Index (definition) - Fertilizers increase the salt concentration of the soil solution. The salt index of a fertilizer is a measure of this phenomenon and is determined by placing the material under study in the soil and measuring the osmotic pressure of the soil solution. Osmotic pressure is expressed in atmospheres. Salt index is actually the ratio of the increase in osmotic pressure produced by the material in question to that produced by the same weight of sodium nitrate, based on a relative value of 100.

TABLE 1

SALT INDEXES OF SELECTED FERTILIZER MATERIALS

MATERIALS	SALT INDEX - PER UNIT OF: RAW MATERIAL	PRIMARY NUTRIENTS
NITROGEN SOURCES		
Sodium Nitrate 16.5%N	100	100
Ammonium Nitrate 35.0%N	105	49
Ammonium Sulfate 21.2%N	69	54
Nitrate of Soda Potash 15%N, 14%K_2O	92	51
Calcium Nitrate 11.9%N	52	73
Urea 46.6%N	75	27
Natural Organics 5%N	4	16
PHOSPHORUS SOURCES		
Regular Superphosphate 20%P_2O_5	8	6
Concentrated Superphosphate 45%P_2O_5	10	4
Monoammonium Phosphate 12.2%N, 61.7%P_2O_5	30	7
Diammonium Phosphate 21.2%N, 53.8%P_2O_5	34	8
POTASSIUM SOURCES		
Potassium Chloride 60%K_2O	116	32
Potassium Nitrate 13.8%N, 46.6%K_2O	74	20
Potassium Sulfate 54%K_2O	46	14
Sulfate of Potash Magnesia 21.9%K_2O	43	32

Prepared by Dr. D. R. Hensel, Potato Investigations Laboratory, Hastings, Florida.

TABLE II

TOTAL SALT INDEXES OF VARIOUS MATERIALS PROVIDING 40 LBS NITROGEN AND 40 LBS K_2O

MATERIAL	ANALYSIS	LBS	UNITS	SALT INDEX UNIT	SALT INDEX TOTAL
Sodium Nitrate	16.5%N	242	2.0	100	200
Potassium Chloride	60%K_2O	67	2.0	32	64
		309	4.0		264
Sodium Nitrate	16.5%N	242	2.0	100	200
Potassium Sulfate	54%K_2O	74	2.0	14	28
		316	4.0		228
Nitrate of Soda Potash	15-0-14	266	3.9	51	200
Potassium Chloride	60%K_2O	5	.1	32	3
		271	4.0		203
Nitraté of Soda Potash	15-0-14	266	3.9	51	200
Potassium Sulfate	54%K_2O	5	.1	14	1
		271	4.0		201
Calcium Nitrate	11.9%N	336	2.0	73	146
Potassium Sulfate	54%K_2O	74	2.0	14	28
		410	4.0		174
Ammonium Nitrate	33.5%N	87	1.4	49	69
Potassium Nitrate	13-0-44	91	2.6	20	52
		178	4.0		121
Urea	45%N	63	1.4	27	38
Potassium Nitrate	13-0-44	91	2.6	20	52
		154	4.0		90

Prepared by Dr. D. R. Hensel, Potato Investigations Laboratory, Hastings, Florida.

TABLE III

SUMMARY OF SEVERAL MATERIALS PROVIDING 40 LBS N AND 40 LBS K_2O

MATERIAL	LBS OF MATERIAL	SALT INDEX	APPROX. COST	% NO_3-N	LBS CHLORINE
Sodium Nitrate & Potassium Chloride	309	264	$ 8.90	100	35
Sodium Nitrate & Potassium Sulfate	316	228	9.60	100	0
Nitrate of Soda Potash & Potassium Sulfate	221	201	9.00	100	0
Calcium Nitrate & Potassium Sulfate	332	188±	10.30	100	0
Ammonium Nitrate & Potassium Nitrate	178	121	6.90	65	0
Ammonium Nitrate & Potassium Chloride	187	162	4.80	50	35
Ammonium Nitrate & Potassium Sulfate	194	126	5.60	50	0
Urea, Ammonium Nitrate & Potassium Nitrate	166	108	7.10	50	0
Urea & Potassium Nitrate	154	90	7.60	30	0
Urea & Potassium Sulfate	153	82	6.70	0	0
Urea & Potassium Chloride	156	118	5.90	0	35

Prepared by Dr. D. R. Hensel, Potato Investigations Laboratory, Hastings, Florida.

Sincerely,

James Montelaro

James Montelaro
Vegetable Crops Specialist