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A STUDY OF 100 TOMATO VARIETIES IN RELATION WITH CLIMATIC ADAPTATION AND RESISTANCE TO 7 PREVALENT DISEASES IN THE WEST INDIES

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INTRODUCTION

A description of all the varieties available in the commercial catalogues would be long and possibly not useful. We limited our study to 100 varieties currently grown, and to those which could present in the future an interest in this area. We did not describe any commercial F_1 hybrid. We know that many of them present a real interest, but commercial names are excessively numerous and changing, so any description would rapidly become obsolete.

The varieties are listed in three classes of adaptation to Caribbean conditions:

1) Good varieties
2) Not well adapted but outstanding for some particular characters
3) Not satisfactory, to be replaced

Reactions to Cladosporium fulvum (Leaf mold, Fusarium oxysporum lycopersici races 1 and 2 (Fusarium wilt), Meloidogyne sp (gall nematodes), Phytophtora infestans (late blight), Pseudomonas solanacearum (Bacterial wilt, Stemphylium solani (gray leaf spot) and Verticillium dahliae (Verticillum wilt) are given. A brief description of each variety is added.

These data were collected from author (s) description, commercial catalogues, and from the results of our trials in Guadeloupe and at Avignon (Southern France).

And estimation of the value of the different varieties for the producers is difficult to establish. However, a synthesis of the appreciation of the economic characters was made for the West Indian conditions using three lists of varieties.

RESULTS

LIST 1 - Varieties considered the best.

They were tried and confirmed as good varieties in Guadeloupe except those marked by an asterisk which are : 1/ very similar to confirmed good varieties

or 2/ bred or confirmed in neighbouring climatic areas.

ANAHU

ARC (*)

ATKINSON

CAMPBELL 17

CAMPBELL 28

CAMPBELL 1327

CHEF (*)

CHICO

CHICO GRANDE

CHICO REX (*)

CHICO III (*)

CLAIRVIL (*)

COLDSET

CRA 74

EASTERN STATES 24

EASTERN STATES 58

ECLAIREUR

EL MONTE (*)

FIREBALL

FLORADEL

FLORALOU

FLORIDA MH 1

GULFSTATE MARKET

HEINZ 1370

HEINZ 1409

HEINZ 1438

HEINZ 1548

HOMESTEAD ELITE

HOMESTEAD 24

HOMESTEAD 61

HOMESTEAD 500

HOTSET

IMMOKALEE

INDIAN RIVER

KOLEA C

LA BONITA (*)

LA FAYETTE

LA PINTA (*)

MANALUCIE

MANAPAL

MARION

MARS (*)

MONEYMAKER

MONITA (*)

MONTE GRANDE (*)

NAPOLI

NEMATEX

PELICAN

PINKDEAL

POTOMAC

RED ROCK

ROMA

ROMA VF(*)

RONITA

ROSSOL

SAMARZANO

SAMARZANO VR

SUMMERTIME

TROPIC

TROPIGRO

TROPIRED

VENDOR

VENTURA (*)

VENUS

WALTER

LIST 2 - Varieties not very well adapted to West Indian conditions.

These varieties are outstanding for particular characters and could be recommended where these qualities are most needed.

Varieties	Particular qualities
BUSH VFN	Multiple disease resistant, large fruit
CAMPBELL 19	Excellent in Eastern USA
HEINZ 1350	Early type for canning
MARSOL	Multiple diseases resistance early
PIERALINE	Large fruit, late blight resistant
PIERNITA	Large fruit, nematode resistant
PIERSOL	Large fruit, multiple disease resistant
PIERVIL	Large fruit, Fusarium resistant
RAF	Early, Fusarium resistant
SATURN	Bacterial wilt resistant, larger than VENUS and CRA 74
STAKELESS	Excellent for family gardens
VF 145	Regular production, Mechanical harvest type
VFN 8	of BUSH VFN
WEST VIRGINIA' 63	Late blight resistant

LIST 3 - Generally not as satisfactory as the preceding varieties.

These varieties are often cited because extensive acreages are grown in the West Indies. We advise the growers to replace these varieties by better adapted ones provided these new introductions meet the market needs.

ACE	CASAQUE ROUGE	MARMANDE VR	PRIMABEL	RED JACKET VR
ACE VR	KAKI	MERIT	PRITCHARD	ROYAL ACE VF
ACE VF	MARGLOBE	OXHEART	PRITCHARD VF	RUTGERS
CALACE	MARMANDE	PIERALBO	RED JACKET	SAINT PIERRE

DISEASE RESISTANCE

They are included in the detailed variety description. In many cases, we did not try the resistance described by the Authors; in such occurrence, we mention "r" in other cases we could try resistance in Guadeloupe for leaf mold (Cladosporium Fulvum) bacterial wilt Pseudomonas solanaceorum) and gray leaf spot (Stemphylium solani) under natural infestation conditions. Resistance to Fusarium race 1 and 2, to gall nematodes (Meloidogyne sp) and late blight (Phythopthora infestans) was appreciated under artificial inoculation conditions at Avignon. When varities were found resistant by ourselves they are mentioned "R" when heterogeneous "Het". In rare cases the resistance described by the authors was not confirmed, the varieties are mentioned "S" for susceptibility.

1/Cladosporiun fulvum (Leaf mold)

Resistance when observed is complete. As new psyciologic races occured causing hertofore resistant varieties to become diseased in temperate greenhouses, a study was begun in Guadeloupe to determine the race situation. Our first results indicate that the race 0,1,3,1-3 (as defined by HUBBELING in the Netherlands) could be present. The same race situation was found by BLISS and ARNY in West Africa (Nigeria). If new races occur, the resistances noted in Guadeloupe and probably conferred by genes of 2 and/or of 4 (as defined in the Netherlands) will become inefficient. "Florida MH1" was found resistant to some races in Florida but is susceptible to the race (s) of Guadeloupe.

2/ Fusarium oxysporum (Fusarium wilt)

When indicated, resistance to race 1 (due to gene I) should be practically complete. However some varieties and particularly "Marglobe" manifest an intermediate resistance level in our trials. "Pinkdeal" and "West Virginia 63" are described resistance by the authors and found susceptible in our tests, which were possibly very severe and could not determine relatively low resistance levels. In intensive Tomato production areas, Fusarium race 2 could appear on varieties bearing I gene. This new race is compeletely controlled by another gene of resistance in "Florida MH1" and "Walter". We found a very high but not complete resistance to race 2 in "CRA 74" "Saturn", "Venus".

3/ Meloidogyne sp (Gall or root-knot nematodes)

Above Circa 30°C soil temperature, the resistance conferred by Mi gene to some varieties ceases to be really effective. This increase in susceptibility at highest temperature is particularly drastic in Mi/+ heterozygous combinations which are often presented as commercial hybrids "resistant to nematodes". Rare cases of appearance of Meloidogyne races able to attack varieties homozygous for Mi in artificial contamination tests and at normal temperature were described.

4/ Phytophthora infestans (Late blight)

Thise disease is generally not observed or not important in our warm conditions. In cooler elevation areas (Domincan Republic, Jamaica) or in the vicinity of continental cold air (Cuba, Habana zone in Winter) its occurrence is frequent; "Pieraline" and "West Virginia 63" show an incomplete but effective resistance in our tests.

5/ Pseudomonas solancearun (Bacterial wilt)

Susceptibility to this destructive soil transmitted disease is very high in all the varieties mentioned except "CRA 74", "Saturn and Venus" which were bred for resistance. However, some plants of these varieties could be severely diseases in difficult conditions. Moreover the resistance in only effective in mature plant, so seedling should be grown in Pseudomonas free soil before planting.

6/ Stemphylium solani (gray leaf spot)

It is often very destructive in West Indian conditions, many varieties carry the Sm gene conferring a good resistance. Epidemics are relatively are around many plant breeding stations, and artificial inoculation is very difficult, so many varieties generally not cited as resistant carry a resistance which was manifest in our trials in Guadeloupe. Conversely, where gray leaf spot is dangerous, it is sometimes necessary to verify the resistance of commercial seed which is not always very carefully bred for reaction to gray leaf spot an unimportant disease in many countries.

7/ Verticillium dahliae (Verticillium wilt)

It is an important disease in Mediterranean and subtropical countries. Its occurence in tropical areas is not frequent but possible in cool soils. Resistance conferred by Ve gene is fully effective except in rare cases where new races of this pathogen appeared.

The authors of "Florida MH1" primitively found that it was bearing Ve gene, but afterwards they discovered it had only an intermediate level of resistance in their tests. We found this variety susceptible in artificial inoculation tests.

TABLE 1 - DETAILED VARIETY, DESCRIPTION

VARIETIES	Origin	List	Climatic Adaptation	Fruit Size	Fruit Shape	Shoulder Color	Plant	Foliage Cover	Growth D=Determinate I=Indeterminate
ACE	U.S.A.	3	Dry	Large	Deep oblate	Uniform	Large	Good	D
ACE VR	Canada	3	Dry	Large	Deep oblate	Uniform	Large	Good	D
ACE VF	U.S.A.	3	Dry	Large	Deep oblate	Uniform	Large	Good	D
ANAHU	Hawaii	I	Warm humid	Medium	Deep oblate	Uniform	Medium	Medium	D
ARC	U.S.A.	1	General	—	Globe	Uniform	—	—	D
ATKINSON	Alabama	1	Warm humid	Large	Globe	Green	Large	Good	I
BUSH VFN	California	2	Dry	Large	Deep oblate	Green	Compact	Good	D
CALACE	California	3	Dry	Large	Deep oblate	Uniform	Large	Good	
CAMPBELL 17	New Jersey	1	General	Medium	Deep oblate	Apple green uniform	Medium large	Good	D
CAMPBELL 19	New Jersey	2	Cool	Medium	Oblate	Apple green uniform	Medium large	Good	D
CAMPBELL 28	New Jersey	I	General	Medium small	Oblate rough	Uniform	Compact	Excellent	D
CAMPBELL 1327	New Jersey	1	General	Medium large	Oblate	Apple green uniform	Large	Good	D
CASAQUE ROUGE	New York	3	Cool	Large	Deep oblate	Uniform	Medium	Medium	I
CHEF	U.S.A.	1	General	—	Globe	Uniform	—	—	D
CHICO	Texas	1	Warm humid	Small	Pear	Uniform	Medium small	Good	D
CHICO III	Texas	1	Warm humid	Small	Pear	Uniform	Small	Poor	D
CHICO GRANDE	Texas	1	Warm humid	Small, larger than Chico	Pear	Uniform	Medium small	Good	D
CHICO REX	Texas	1	Warm humid	-do-	Pear	Uniform	Medium small	Good	D
CLAIRVIL	France	1	General		Globe	Uniform	Large	Good	I
COLDSET	Ontario	1	General	Small	Deep oblate	Uniform	Medium small	Good	D
CRA 74	Guadeloupe	1	Warm humid	Medium	Deep oblate	Green	Large	Good	I
EASTERN STATES 24	Eastern USA	1	General	Medium small	Deep oblate	Uniform	Medium	—	D
EASTERN STATES 58	Eastern USA	1	General	Medium	Deep oblate	Uniform	Medium	Good	D
ECLAIREUR	France	1	General	Small	Globe	Uniform	Large	Good	I
EL MONTE	Texas	1	Warm humid	Medium	Deep oblate	Green	Medium	Good	D
FIREBALL	Eastern USA	1	General	Small	Globe	Green	Medium	Good	D
FLORADEL	Florida	1	Warm humid	Large	Deep oblate	Green	Large	Good	I
FLORALOU	Florida	1	Warm humid	Medium large	Deep oblate	Green	Large	Good	I
FLORIDA MH 1	Florida	1	Warm humid	Medium large	Deep oblate	Uniform	Compact	Good	D
GULF STATE MARKET	Southern US	1	Warm humid	Medium large	Deep oblate	Uniform	Compact	Good	I
HEINZ 1350	Ohio	2	Cool	Medium	Deep oblate	Uniform	Short	Medium	D
HEINZ 1370	Ohio	1	General	Medium small	Globe	Uniform	Medium	Good	D
HEINZ 1409	Ohio	1	General	Medium	Deep oblate	Uniform	Medium	Good	D
HENIZ 1439	Ohio	1	General	Medium	Deep oblate	Uniform	Medium	Good	D
HENIZ 1548	Ohio	1	General	Medium	Deep oblate	Uniform	Medium	Medium	D
HOMESTEAD 24	S. Carolina	1	Warm humid	Largest H in Guadeloupe	Deep oblate	Green	Medium	Good	D
HOMESTEAD 61	S. Carolina	1	Warm humid	Medium large	Deep oblate	Green	Medium	Good	D
HOMESTEAD 560	S. Carolina	1	Warm humid	Medium large	Deep oblate	Green	Medium	Good	D
HOMESTEAD ELITE	S. Carolina	1	Warm humid	Medium large	Deep oblate	Green	Medium	Good	D
HOTSET	Texas	1	Hot	Small	Globe	Green	Large	—	I
IMMOKALEE	Florida	1	Warm humid	Medium large	Globe	Green	Medium	Good	D
INDIANRIVER	Florida	1	Warm humid	Medium large	Globe	Green	Large	Good	I
KAKI	France	3	Dry	Large	Globe	Green	Large	Good	I
KOLEA/C	Hawaii	1	Warm humid	Medium	Deep globe	Uniform	Medium	Medium	D
LA BONITA	Texas	1	Warm humid	Small	Plum	Uniform	Compact	Good	D
LAFAYETTE	Indiana	1	General	Small	Plum	Uniform	Compact	Excellent	D
LA PINTA	Texas	1	Warm	Medium	Globe	Uniform	—	—	D
MANALUCIE	Florida	1	Warm humid	Large	Deep globe	Green	Large	Good	I
MANAPAL	Florida	1	Warm humid	Medium large	Globe	Green	Large	Good	I
MARGLOBE	U.S.A.	3	—	Medium large	Globe	Green	Large	Fair	I
MARION	S. Carolina	1	Warm humid	Medium	Deep oblate	Green	Large	Good	I
MARMANDE	France	3	Cool	Medium small	Oblate rough	Green	Medium	Fair	I
MARMANDE VR	Canada	3	Cool	Medium small	Oblate rough	Green	Medium	Fair	I
MARS	New Jersey	1	General	Small	Globe	Green	Small compact	Reduced	D
MARSOL	France	2	Cool	Medium small	Oblate rough	Green	Medium	Fair	I
MERIT	Maryland	3	General	Small	Globe	Uniform	Small	Poor	D
MONEYMAKER	England	1	General	Small	Globe	Uniform	Large	Good	I
MONITA	France	1	General	Small	Globe	Uniform	Large	Good	I
MONTE GRANDE	Texas	1	Warm humid	Medium large	Deep oblate	Green	Medium	Good	D
NAPOLI	U.S.A.	1	General	Small	Pear	Uniform	Medium	Good	D

TABLE 1 (contd)

VARIETIES	Origin	List	Climatic Adaptation	Fruit Size	Fruit Shape	Shoulder Color	Plant	Foliage Cover	Growth D=Determinate I=Indeterminate
NEMATEX	Texas	1	Warm humid	Medium small	Deep oblate	Green	Compact	Excellent	D
OXHEART	Texas	3		Large	Heart	Green	Large	Good	I
PELICAN	Louisiana	1	Warm humid	Large	Deep oblate	Green	Large	Good	I
PIERALBO	France	3	Dry	Large	Globe	Green	Large	Good	I
PIERALINE	France	2		Large	Globe	Green	Large	Good	I
PIERNITA	France	2	Dry	Large	Globe	Green	Large	Good	I
PIERSOL	France	2	Dry	Large	Globe	Green	Large	Good	I
PIERVIL	France	2	Dry	Large	Globe	Green	Large	Good	I
PINKDEAL	Texas	1	Warm humid	Medium	Globe	Uniform	Medium	Good	D
POTOMAC	Maryland	1	Warm humid	Small	Long	Uniform	Small	Reduced	D
PRIMABEL	France	3	Cool	Small	Globe	Uniform	Small	Reduced	D
PRITCHARD	U.S.A.	3		Medium large	Globe	Green	Large	Good	D
PRITCHARD VF	U.S.A.	3		Medium large	Globe	Green	Large	Good	D
RAF	France	2	Cool	Medium small	Oblate rough	Green	Medium	Fair	D
RED JACKET	New York	3	Cool	Large	Deep oblate	Uniform	Medium	Medium	I
RED JACKET VR	Canada	3	Cool	Large	Deep oblate	Uniform	Medium	Medium	I
RED ROCK	Maryland	1	Warm humid	Medium small	Deep globe	Uniform	Small	Intermediate	D
ROMA	Maryland	1	General	Small	Pear	Uniform	Large	Good	D
ROMA VF	California	1	General	Small	Pear	Uniform	Large	Good	D
RONITA		1	General	Small	Pear	Uniform	Large	Good	D
ROSSOL	France	1	General	Small	Pear	Uniform	Large	Good	D
ROYALACE VF	California	3	Dry	Large	Deep oblate	Uniform	Large	Good	D
RUTGERS	New Jersey	3		Large	Globe	Green	Large	Good	I
SAINT PIERRE	France	3	Dry	Large	Globe	Green	Large	Good	I
SAN MARZANO	Italy	1	General	Small	Long	Green	Medium	Good	I
SAN MARZANO VR		1	General	Small	Long	Green	Medium	Good	I
SATURN	N. Carolina	2	Warm humid	Medium large	Deep oblate	Green	Large	Good	I
STAKELESS	Delaware	2	General	Medium large	Deep oblate	Uniform	Dwarf	Excellent	D
SUMMERTIME	Texas	1	Warm humid	Small	Oblate	Green	Compact	Good	D
TROPIC	Florida	1	Warm humid	V. large	Globe	Green	Large	Good	I
TROPIGRO	Florida	1	Warm humid	Medium large	Deep oblate	Green	Medium	Good	D
TROPIRED	Florida	1	Warm humid	Medium	Deep oblate	Green	Medium	Good	D
VENDOR	Ontario	1	General	Medium	Deep oblate	Uniform	Large	Good	I
VENTURA		1	General	Small	Pear	Uniform	Compact	Fair	D
VENUS	N. Carolina	1	Warm humid	Medium large	Deep oblate	Green	Large	Good	I
VFI45 (Many lines)	California	2	Dry	Medium small	Globe	Green or uniform	Medium to small	Rolled	D
VFN 8	California	2	Dry	Medium large	Deep oblate	Uniform	Short	Medium	D
VFN BUSH	California	2	Dry	Large	Deep oblate	Green	Compact	Good	D
WALTER	Florida	1	Warm humid	Large	Deep oblate	Green	Compact	Good	D
WEST VIRGINIA 63	W. Virginia	2	Humid	Medium large	Deep oblate	Uniform	Large	Good	I

TABLE 2 - VARIETAL REACTION TO DISEASES

R=Resistance observed by authors
r=Resistance reported by others

VARIETIES	Cladosporium L.M.	Fusarium race 1 F.W.1	Fusarium race 2 F.W.2	Meloidogyne Nem.	Phythophthora L.B.	Pseudomonas B.W.	Stemphylium G.L.S.	Verticillium V.W.	Remarks
ACE									Used for canning (juice)
ACE VR								r R	Ace type added resistance
ACE VF		r R						r R	Ace type added resistance
ANAHU		r R		r R			r R		Very susceptible to leaf mold
ARC		r					r	r	Mechanical harvest type
ATKINSON		r		r			r R		Rutgers type disease resistant
BUSH VFN		r		r				r	Multiple disease resistance
CALACE		r						r	Ace type added resistance
CAMPBELL 17		r						r	Crack resistant
CAMPBELL 18		r						r	Not so productive in Guadeloupe
CAMPBELL 23		r					R		Crack resistant
CAMPBELL 1327		r R						r R	Crack resistant
CASAQUE ROUGE									Potato leaf
CHEF		r					r	r	Jointless mechanical harvestable
CHICO		r					r		Irregular fruits more disease resistance than Roma
CHICO III		r					r R		Chico type, Machine harvestable
CHICO GRANDE		r					r		Chico type larger
CHICO REX		r					r		Chico type larger
CLAIRVIL							r R		Eclaireur type more disease resistant
COLDSET							r R		Sets well under extreme temperature
CRA 74		r R	r R			r R	r R		Productive in Guadeloupe
EASTERN STATES 28		r					R		Firm
EASTERN STATES 88		r					r R		Firm
ECLAIREUR									Crack resistant
EL MONTE		r					r		Homestead type added resistance
FIREBALL									Early
FLORADEL	r R	r R					r R		Very popular variety in W.I.
FLORALOU	r R	r R					r R		Smaller than Floradel
FLORIDA MH 1	(r) S	r R	r R				r R	(r) S	Jointless, machine harvest fresh market
GULF STATE MARKET									Mature fruit pink
HEINZ 1350		r R						r R	
HEINZ 1370		r R					r R		Firm, crack resistant
HEINZ 1409		r					r R		Firm, crack resistant
HEINZ 1439		r					R	r	Firm, crack resistant
HEINZ 1946		r					Het		Firm, crack resistant
HOMESTEAD 24		r							Fresh market for ground culture
HOMESTEAD 61		r							Fresh market for ground culture
HOMESTEAD 500		r							Possibly more productive than regular Homestead
HOMESTEAD ELITE		r							Fresh market for ground culture
HOTSET		r R							Old variety
IMMOKALEE		r					r		Shorter than Homestead
INDIAN RIVER	r R	r					r R		Smaller than Floradel
KAKI									Saint Pierre type
KOLEA C		r		r R			r		Disease resistant
LA BONITA		r					r		Machine harvestable
LA FAYETTE		r						r	Machine harvestable, crack resistant
LA PINTA		r					r		Mature fruits pink
MANALUCIE	r R	r R					r R		Late
MANAPAL	r R	r R					r R		Late, productive
MARGLOBE									Late
MARION		r R					r R		Resist to early blight in S. Carolina
MARMANDE									Extra early, good shipper
MARMANDE VR								r R	Marmande type, more disease resistant
MARS		r					r	r	Mechanical harvest type
MARSOL		r R		r R				r R	Marmande type disease resistant
MERIT		r						r	Very firm, jointless mechanical harvest poor yield
MONEYMAKER									Old variety
MONITA				r R					Moneymaker type
MONTE GRANDE		r					r		Similar to El Monte. Larger than Roma
NAPOLI		r						r	Roma type

TABLE 2 (contd)

VARIETIES	Cladosporium L.M.	Fusarium race 1 F.W.1	Fusarium race 2 F.W.2	Meloidogyne Nem	Phythophthora L.B.	Pseudomonas B.W.	Stemphylium G.L.S.	Verticillium V.W.	Remarks
NEMATEX		r		r			r R		Soft, productive
OXHEART									Old variety
PELICAN		r		r			R		Crack and disease resistant
PIERALBO								r R	S. Pierre type added resistant;
PIERALINE					r R			r R	S. Pierre type added resistance
PIERNITA				r R					S. Pierre type added resistance
PIERSOL		r R		r R				r R	S. Pierre type added resistance
PIERVIL		r R							S. Pierre type added resistance
PINKDEAL		(r) S							Very crack resistant
POTOMAC		r					r R	r	Mechanical harvest type poor color
PRIMABEL									Early
PRITCHARD									Old variety
PRITCHARD VF		r						r	Disease resistant, Pritchard type
RAF		r							Marmande type, disease resistant
RED JACKET									Potato leaf
RED JACKET VR								r	Red jacket type
RED ROCK		r					r R	r	Jointless, crack resistant, Mechanical harvest
ROMA		r R							Blossom end, root susceptible
ROMA VF		r R					r R		Roma type, added resistance
RONITA		r R		r R					Roma type, added resistance
ROSSOL		r R		r R				r R	Roma type, disease resistant
ROYAL ACE VF		r						r	Ace type disease resistant
RUTGERS		r							Late old varieties
SAINT PIERRE									Late old varieties
SAN MARZANO									Not for fresh market, paste type
SAN MARZANO VR									San Marzano type, added resistance
SATURN		r R	R			r R	R		Less productive, larger than Venus
STAKELESS		r							Potato leaf type
SUMMERTIME							R		Sets well at high temperature
TROPIC		r					r R	r	Excellent quality
TROPIGRO		r					r R	r	Comparable to Homestead, more disease resistant
TROPIRED		r					r R	r	More productive and disease resistant than Homestead in Guadeloupe
VENDOR	r								
VENTURA		r							Early machine harvest type
VENUS		r R	R			r R	R		Poor set under adverse conditions butdisease resistant
VF 145		r						r	Mechanical harvest type for peeled tomatoes, regular producer
VFN 8		r R		r R			Het	r R	Very susceptible to leaf mold resistant to 3 diseases
VFN BUSH		r		r				r	Multiple disease resistance
WALTER		r R	r R				r		Multiple disease resistance comparable to Homestead
WEST VIRGINIA 63		(r) S			r R			r R	Disease resistant.