

A Review of Late Blight in Pakistan

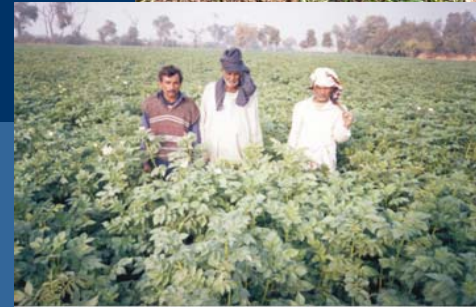


AFGHANISTAN

Islamābād

IRAN

PAKISTAN



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Arabian Sea

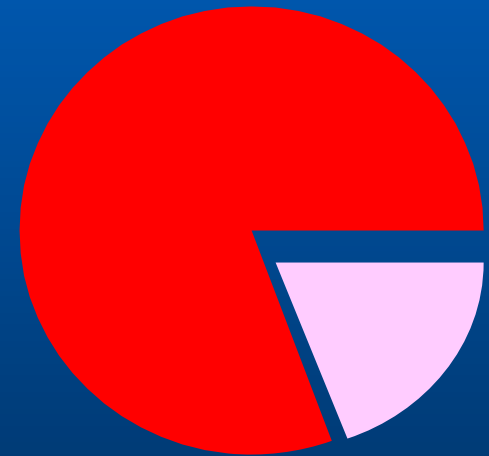
Potatoes in Pakistan

- Potatoes are grown largely by small holders in Pakistan
- Majority of the farmers are illiterate!



Small / medium farmers (80.5%)

42.8% < 5ha



Large farmers
19.5%

Potatoes in Pakistan

Year	Area (000/Ha)	Production (000 MT)	Yield (MT)
2000-2001	101.5	1665.7	16.4
2001-2002	105.2	1721.7	16.4
2002-2003	115.8	1946.3	16.8
2003-2004	109.7	1938.1	17.7
2004-2005	112.0	2024.9	18.1
2005-2006	117.4	1567.9	13.4

Potatoes in Pakistan

Crop	Share (%)
Spring	5-10
Summer	10-15
Autumn	80-85
Winter	0.2-0.3



Potato Varieties Being Grown in Pakistan

Red Skin

Desiree

Cardinal

SH-5

Faisalabad Red

Symfonia

Raja

Asterix

Kuroda

Shannon

Burna

White Skin

Diamant

Faisalabad White

Sante

Adora

Dura

Saleny

Bellini

Late Blight of Potato in Pakistan

- Plains of Punjab
- North West Frontier Province

More recently:

- Baluchistan
- Northern Areas

- Primarily tuber borne
- Increasingly polycyclic
- Oospore formation suspected but not confirmed
- Yield losses 0-50%



Distribution, incidence and severity of late blight in different agro-ecological zones.

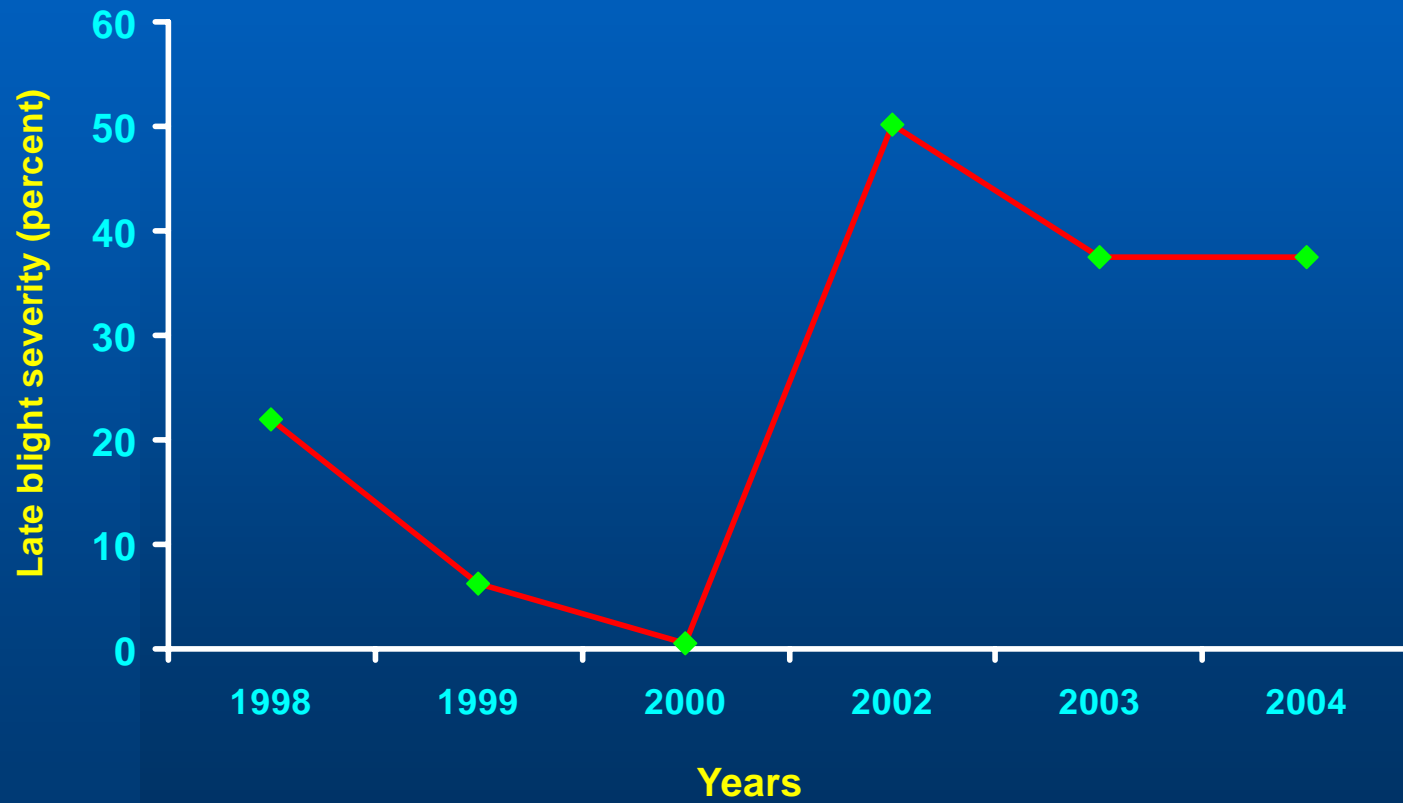
Zone	Planting / harvest time of potato	Distribution	Severity
1	Oct. / Jan. - Feb.	-	n.a.
2 a	Jan. - Feb. / May - June	+	**
b	Sep. - Oct. / Nov. - Jan.	+	*
3 a	Jan. - Feb. / May - June	+	**
b	Sep. - Oct. / Jan. - Feb.	+	*
4 a	Dec. - Feb. / May - June.	++	**
b	Aug. - Sep. / Nov. - Dec.	+	*
5	Apr. - May / Aug. - Sep.	++	*/**
6	May - June / Sep. - Oct.	++	**
7	Apr. - June / Aug. - Oct.	-	n.a.
8 c	Mar. / July	-	n.a.
d	Apr. - May / Sep. - Oct.	-	n.a.

a = Spring crop, b = Autumn crop, c = Early summer crop, d = Main summer crop, ++ common almost every year, + common not every year, ** severe damage, * moderate damage, n.a. not applicable.

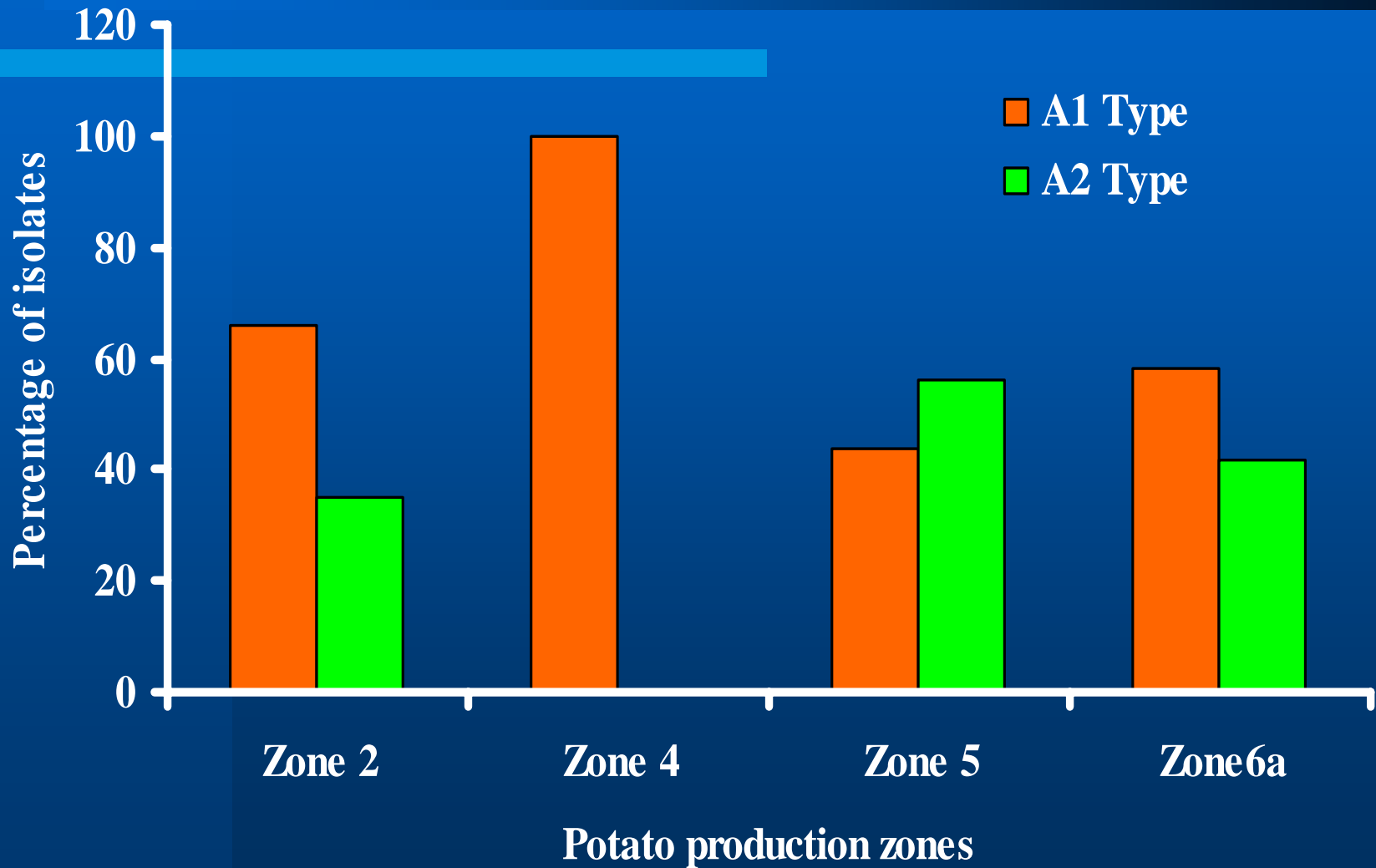
Likely start of late blight epidemic in different agro-ecological zones

CROP	ZONES	stage	% LOSSES
Autumn	2b, 3b, 4b	Mature	30%
Spring	2a, 3a, 4a	Early bulking	100%
Early Summer	4a,	Late bulking	75%<
Summer	5 and 6	Bulking stage	75%

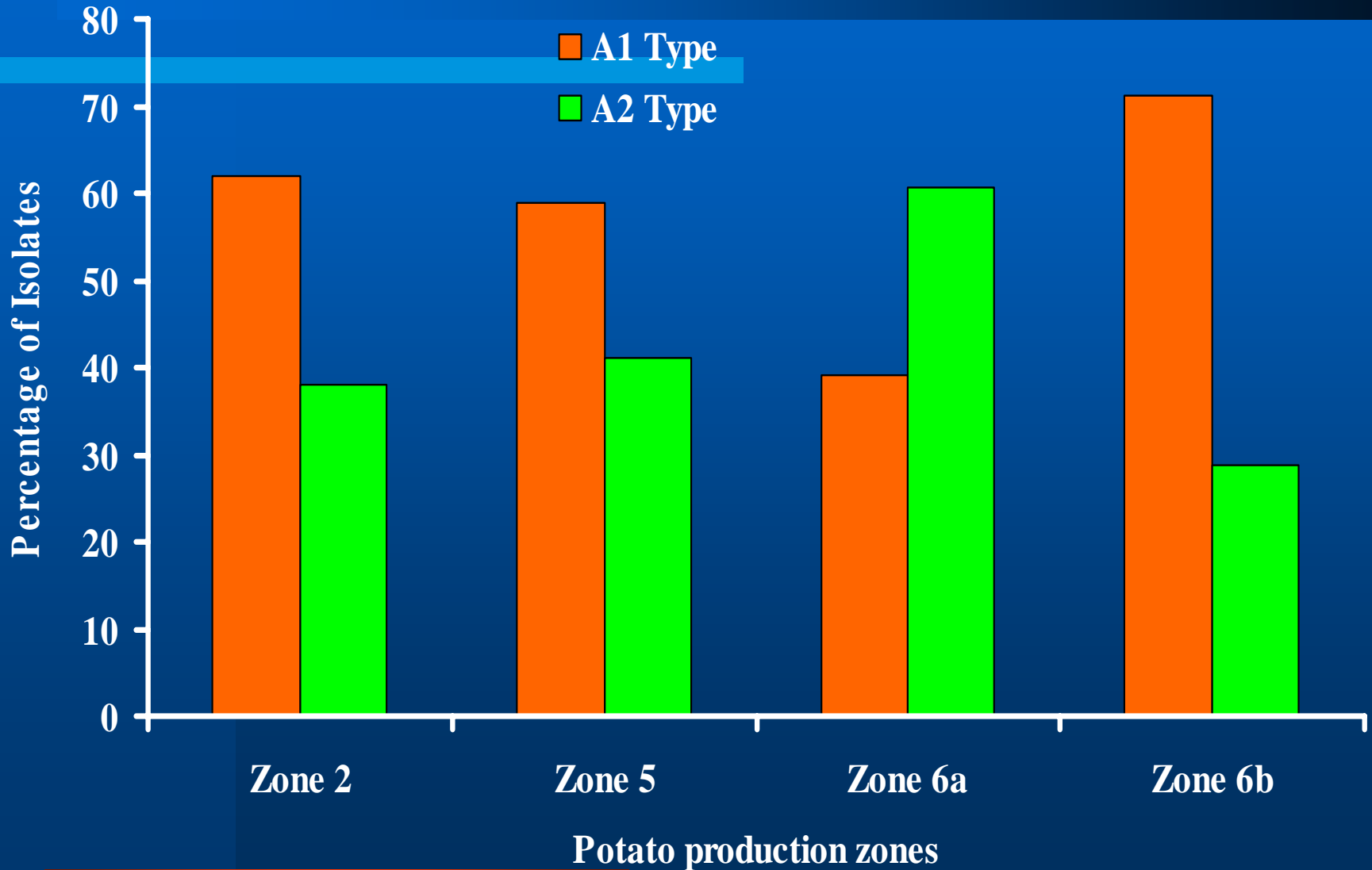
Late blight Severity from 1998-2004



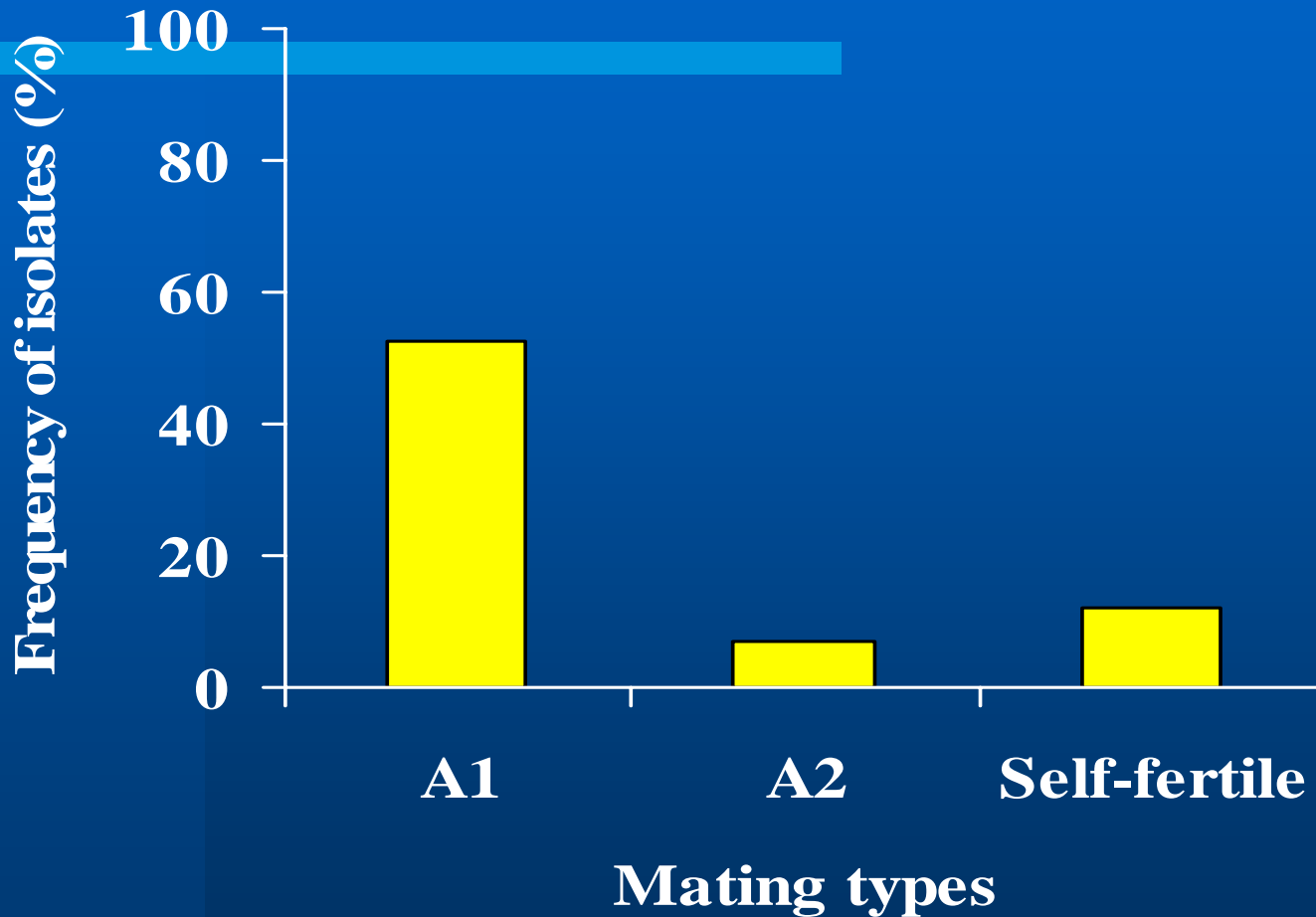
A1 and A2 mating types during 1997-98



A1 and A2 mating types during 1998 -99

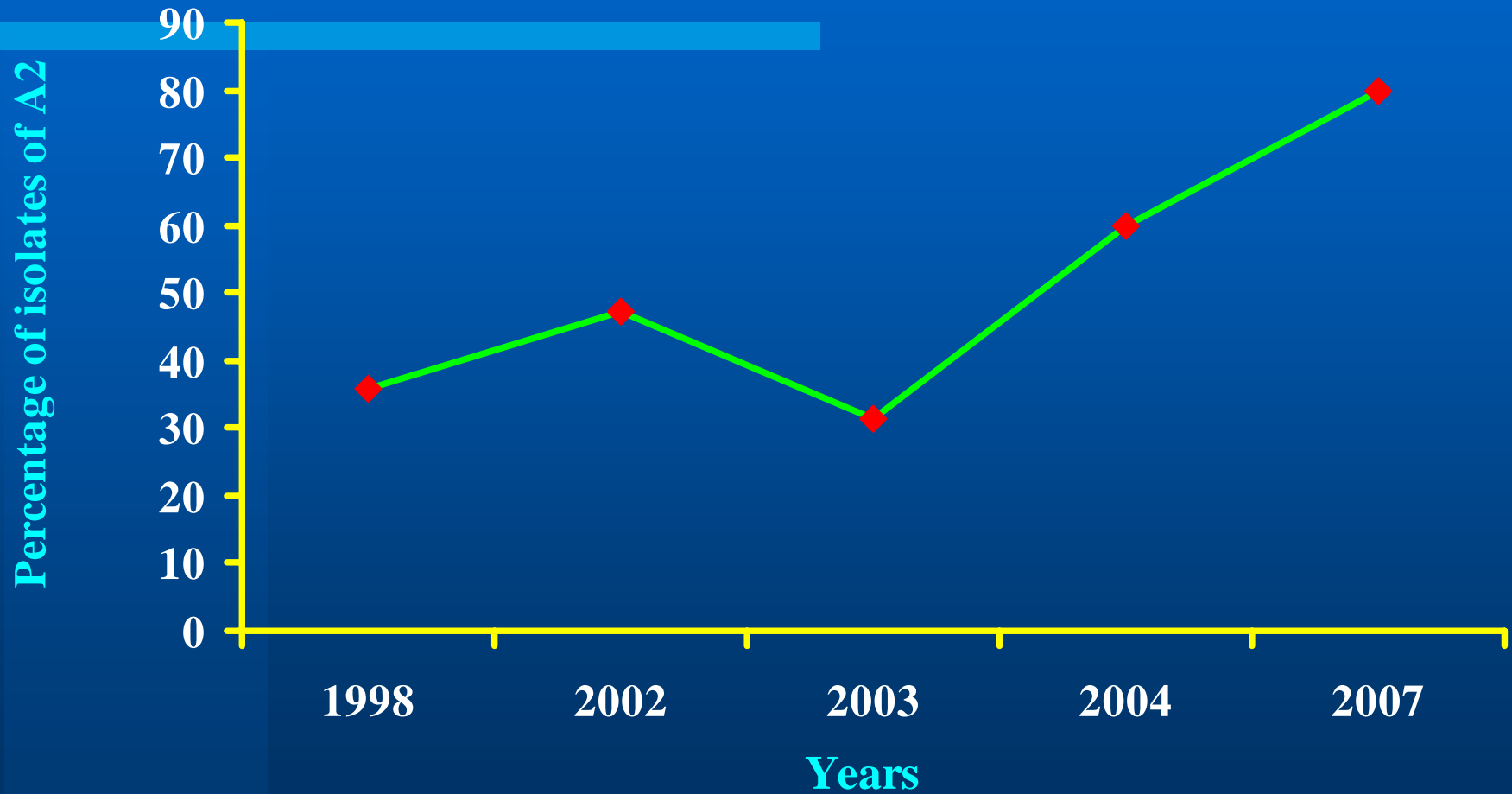


A1 and A2 mating types during 1999-2000



Population of zone 2 only was available for analysis

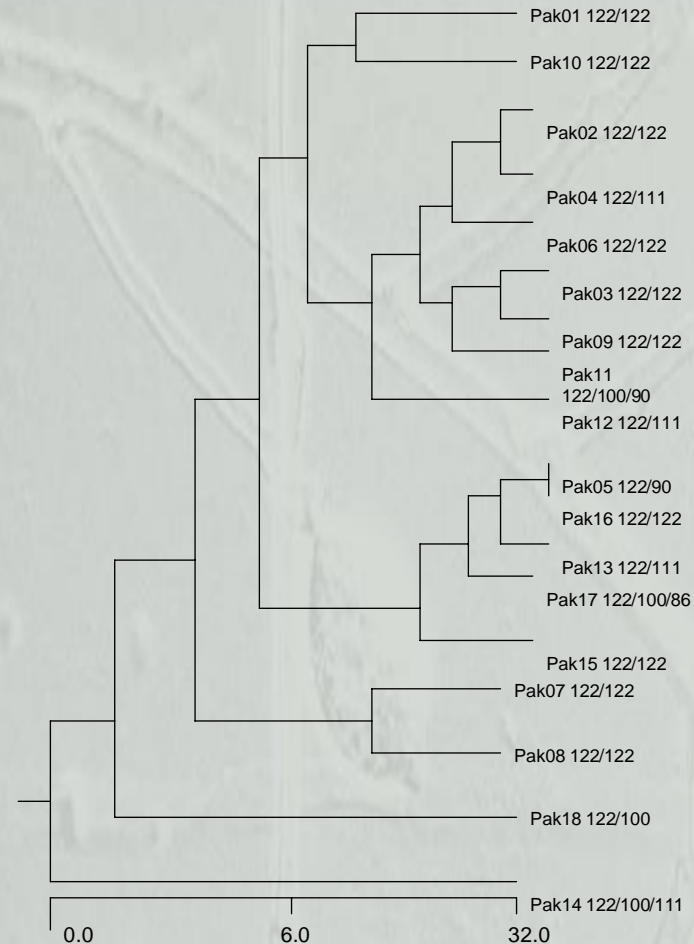
Frequency of A2 Mating Type of *P. infestans* from 1998 to 2007



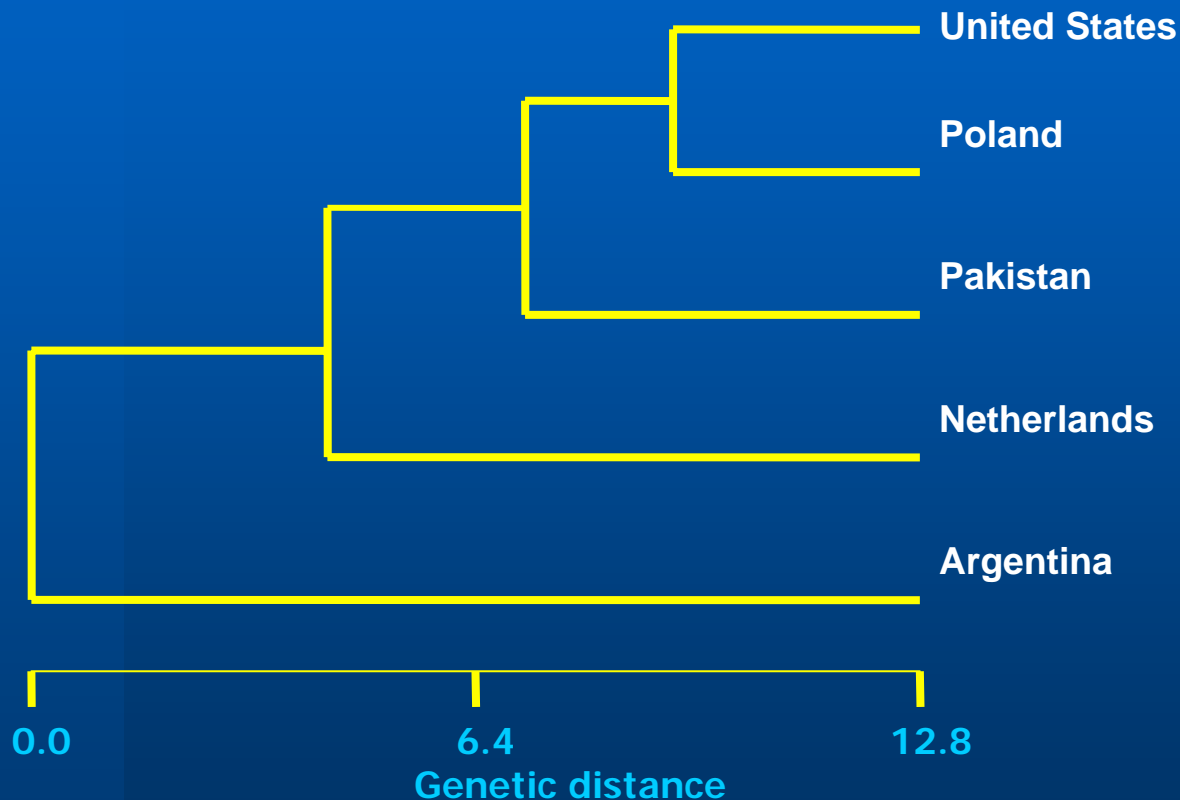
Genetic similarity between RFLP genotypes of *P. infestans* of Pakistan

Fourteen Gpi genotypes are identified in collection of *P. infestans* from different potato growing areas indicating high genetic diversity. Gpi122/122 is most frequent.

RG-57 based RFLP fingerprinting of Gpi122/122 with others Gpi show that it clusters tightly with other genotypes.



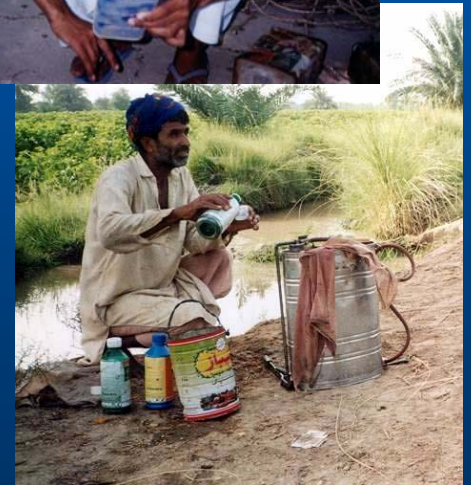
Genetic relationship between *P. infestans* population Pakistan and other countries.



P. infestans population from Pakistan closely clusters with population of USA and Poland

Chemical Management

- Earlier, contact spray fungicides were used for economical late blight management
- Metalaxyl based formulations are now being widely used resulting in resistance build up leading to difficulties in late blight management.
- Neem (based botanicals, such as neem-seed oil, are very potent under in-vitro and green house tests and hold promise, but have not found their way to the field.



Late Blight Resistance

- All commercial varieties in use are susceptible to late blight.
- Resistance screening programme started in 2000
- Has led to identification of four late blight resistance clones from CIP material in 2006:
clones 9625, 396239-61, 101-58 and 396240-6) are being used in breeding programme.



Management of Late Blight

- Laboratory to Farm?
- Farmer Field Schools for Potato with support from SDC Switzerland and CIP in Late 1990.
- Now Rich Experience in other crops like cotton



FFS Experiences in Pakistan

- Farmer to Farmer Education
- Women Open Schools
- Children Ecology Clubs
- Family IPM
- Group FFS
- Village IPM
- Public Private Partnership
- Enterprise Development



Thanks and Acknowledgements

Thank You for Your Attention

Colleagues at:

Institute of Plant and Environmental Protection, PARC
National Coordinated Potato Programme, PARC

GILB