Variability in rainfed crop-growing period at Hisar

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Introduction

- Importance of rainfed crop-growing period characterization
  - Beginning, Ending, Length and Variability
- Dry and wet spells during growing period
- Probability analysis
- Impacts of climate change



Location

- Hisar, hot typic-arid ecological sub region
- Medium to deep sandy loams
- Low to medium (75-125 mm) AWC
- Pearl Millet and cotton are major *Kharif* crops
- Wheat, mustard and chickpea are important *Rabi* crops



Methods

- Daily agromet data of Hisar for the period 1970-2007
- Reference crop evapotranspiration by the FAO-Penman-Monteith method (*Allen et al 1998*); Water balance by Thornthwaite method
- Begin and end of GP - Index of moisture adequacy (IMA), ratio of AET to PET, expressed as a percentage
- Begins when the IMA is above 50% consecutively for at least two weeks, starting from Jun
- Ends when the IMA falls below 25% for two consecutive weeks, when worked out backwards from end of Dec



Methods Contd.

Dry and wet spells during the crop-growing season identified based on IMA

Type of spell	IMA (%)
Very dry	0-25
Dry	26-50
Semi-moist	51-75
Moist	76-95
Wet	96-100

Dry and wet spells delineated using the GIS technique (Avenue script in Arcview)

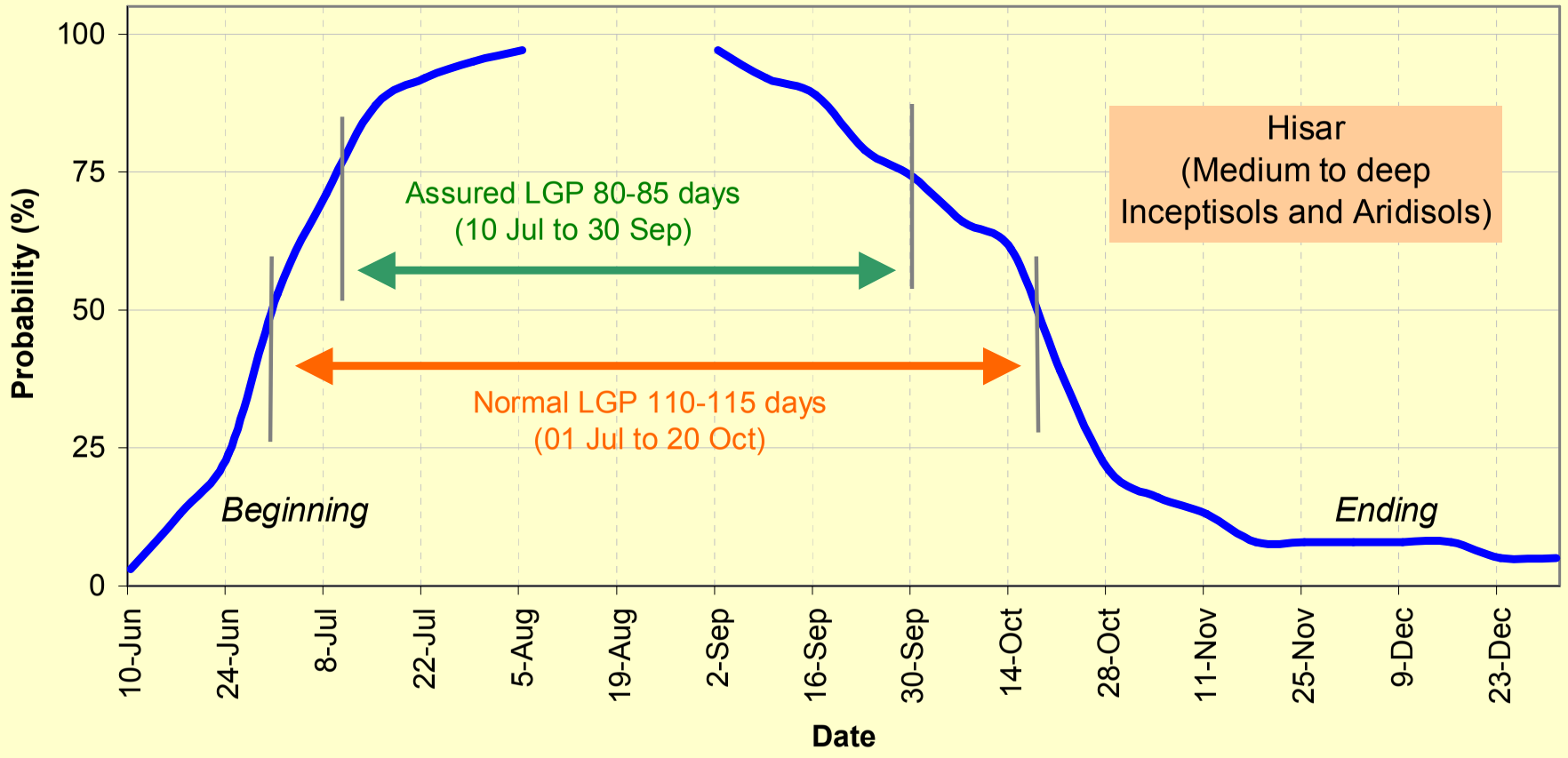


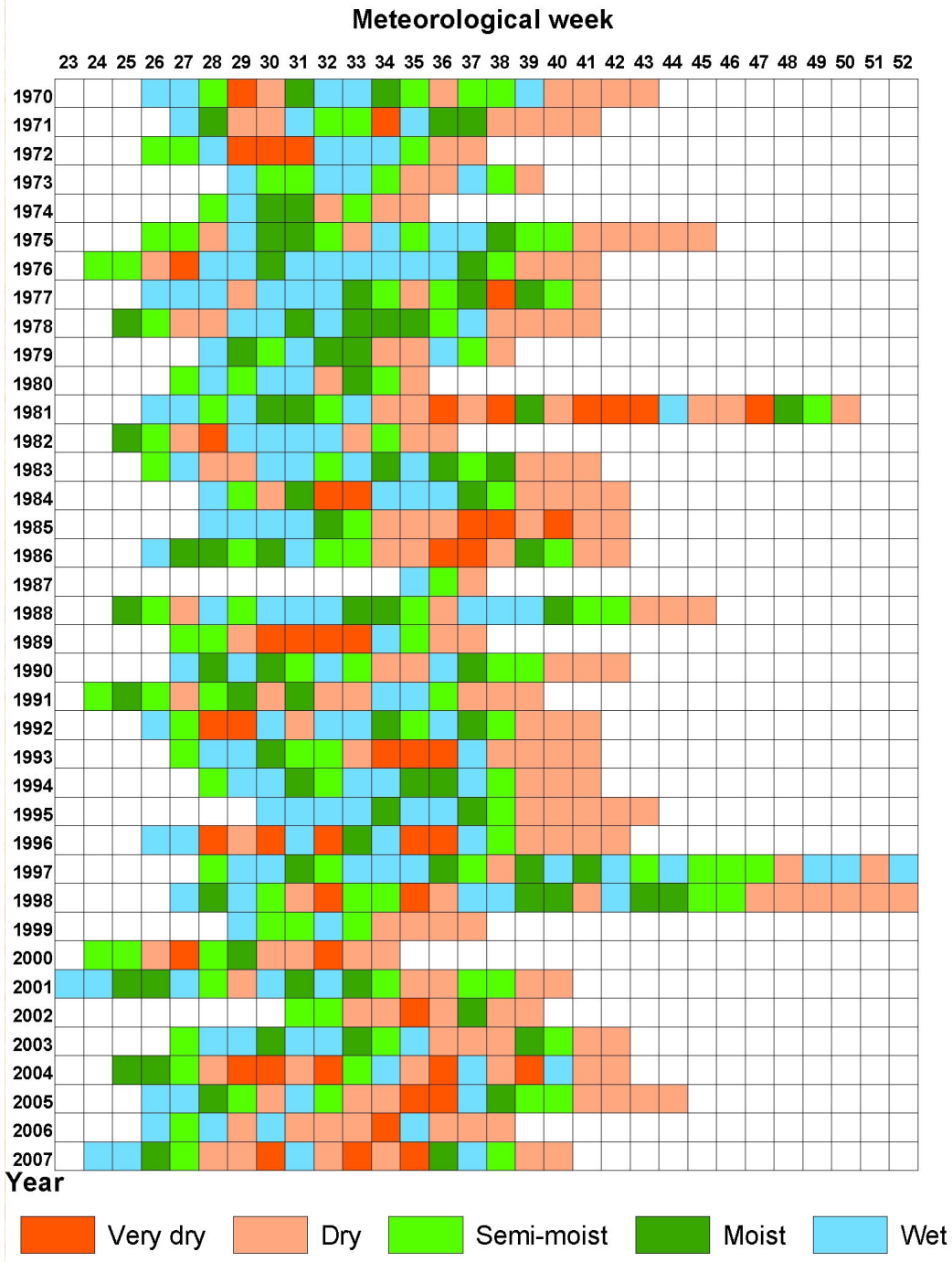
LGP Characters at Hisar

Character	Normal	Assured	Standard Deviation (days)	Coefficient of Variation (%)
Beginning	01 Jul	10 Jul	15	8
End	20 Oct	30 Sep	29	10
Length (days)	115	85	34	31



LGP Characters at Hisar Contd.





Dry and wet spells at Hisar

- Variation in start and end of growing period
- End is more variable than the start
- No definite relation between beginning and end
- Can start as early as 10 Jun or as late as 05 Aug; End as early as 02 Sep
- Longest (180 days) in 1998; best in 1997
- Shortest in 1974 (55 days)
- Droughts (dry spell of more than three consecutive weeks) occur at various stages of crop growth

Water balance during growing period

- Rainfall variation 50 mm - 340 mm - 660 mm
- AET variation 110 mm - 295 mm - 450 mm
- Water deficit variation 110 mm - 225 mm - 415 mm
- Water surplus variation Nil - 45 mm - 190 mm
- In a watershed area of 500 ha,
  - 0.1 million m^3 of runoff in normal years
  - 0.5 million m^3 of runoff in wet years
  - Part of these can be harvested and stored for supplemental irrigation

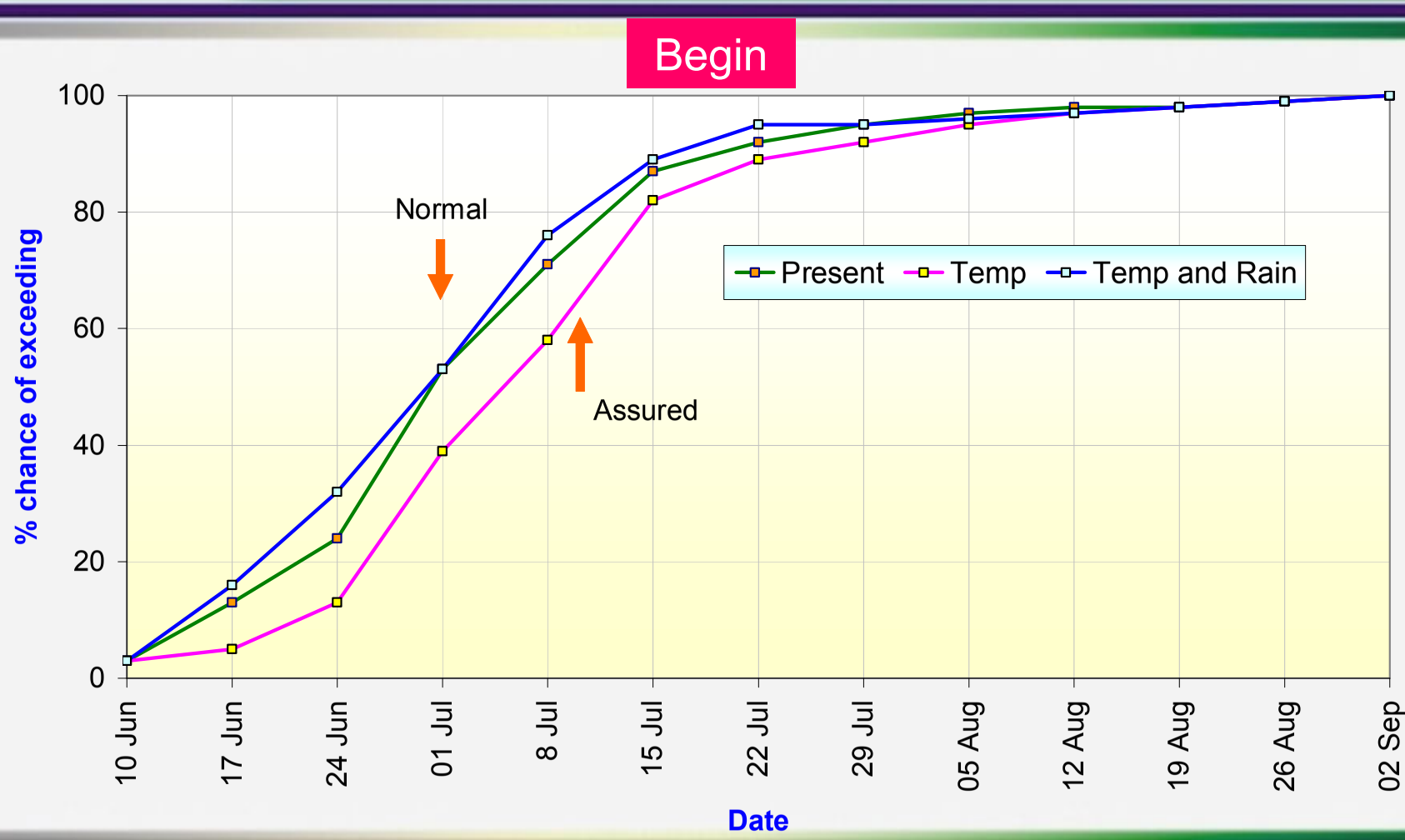


IPCC regional predictions for A1B scenario

Period	Temperature response (°C)					Precipitation response (%)				
	Min	25	50	75	Max	Min	25	50	75	Max
DJF	2.7	3.2	**3.6**	3.9	4.8	-35	-9	**-5**	1	15
MAM	2.1	3.0	**3.5**	3.8	5.3	-30	-2	**9**	18	26
JJA	1.2	2.2	**2.7**	3.2	4.4	-3	4	**11**	16	23
SON	2.0	2.5	**3.1**	3.5	4.4	-12	8	**15**	20	26
Annual	2.0	2.7	**3.3**	3.6	4.7	-15	4	**11**	15	20

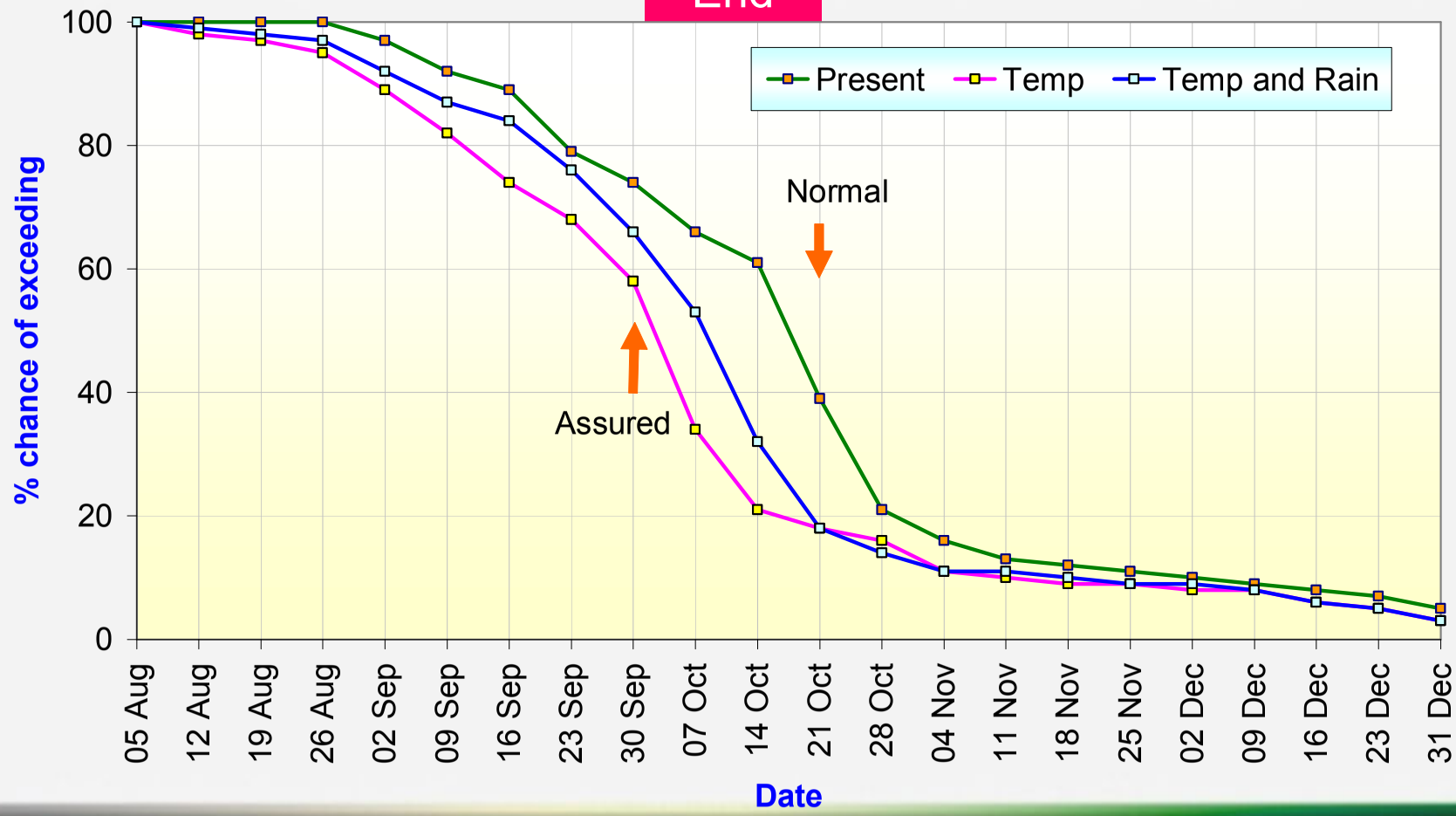


Climate change impacts on growing period

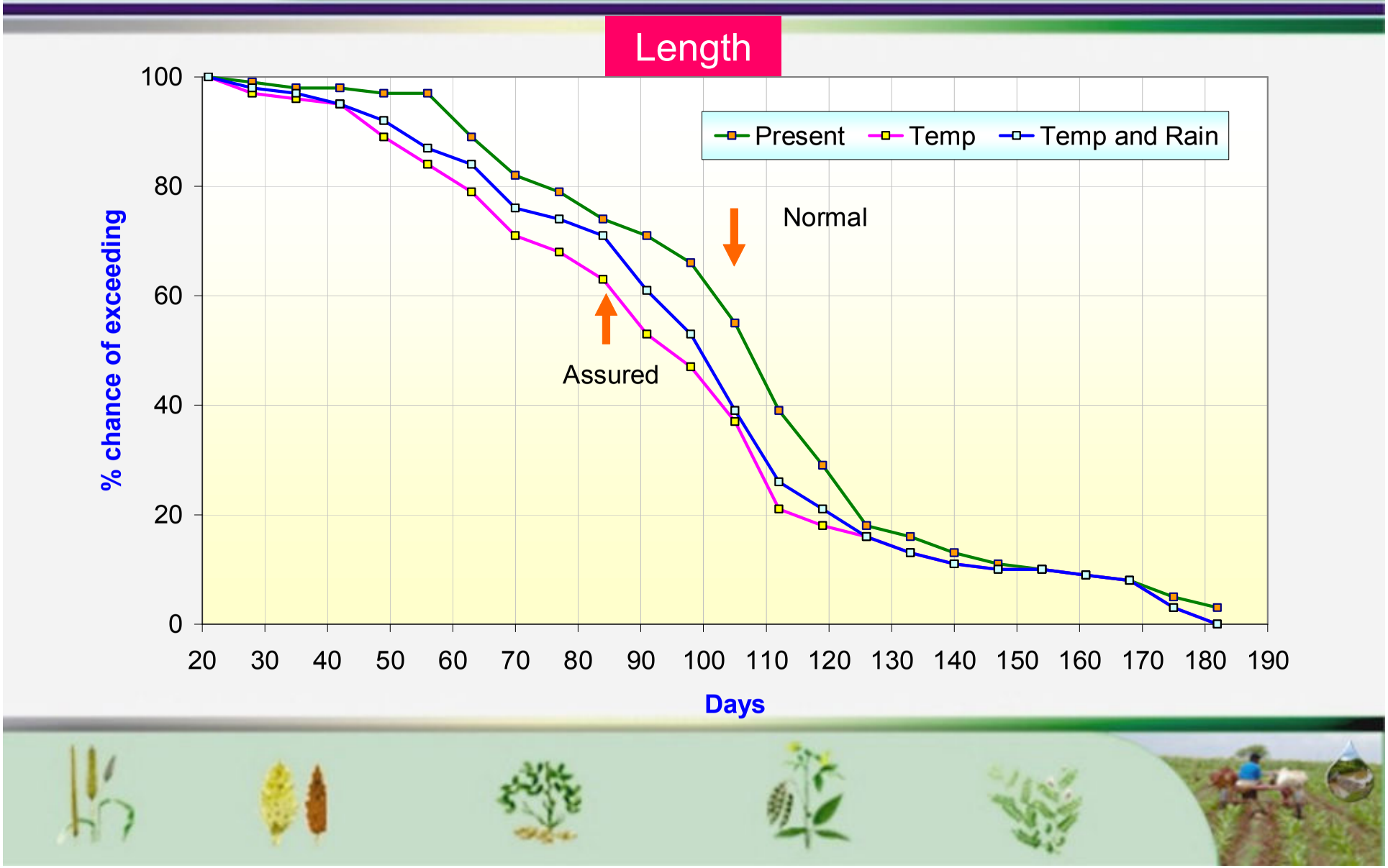


Climate change impacts on growing period Contd.

End

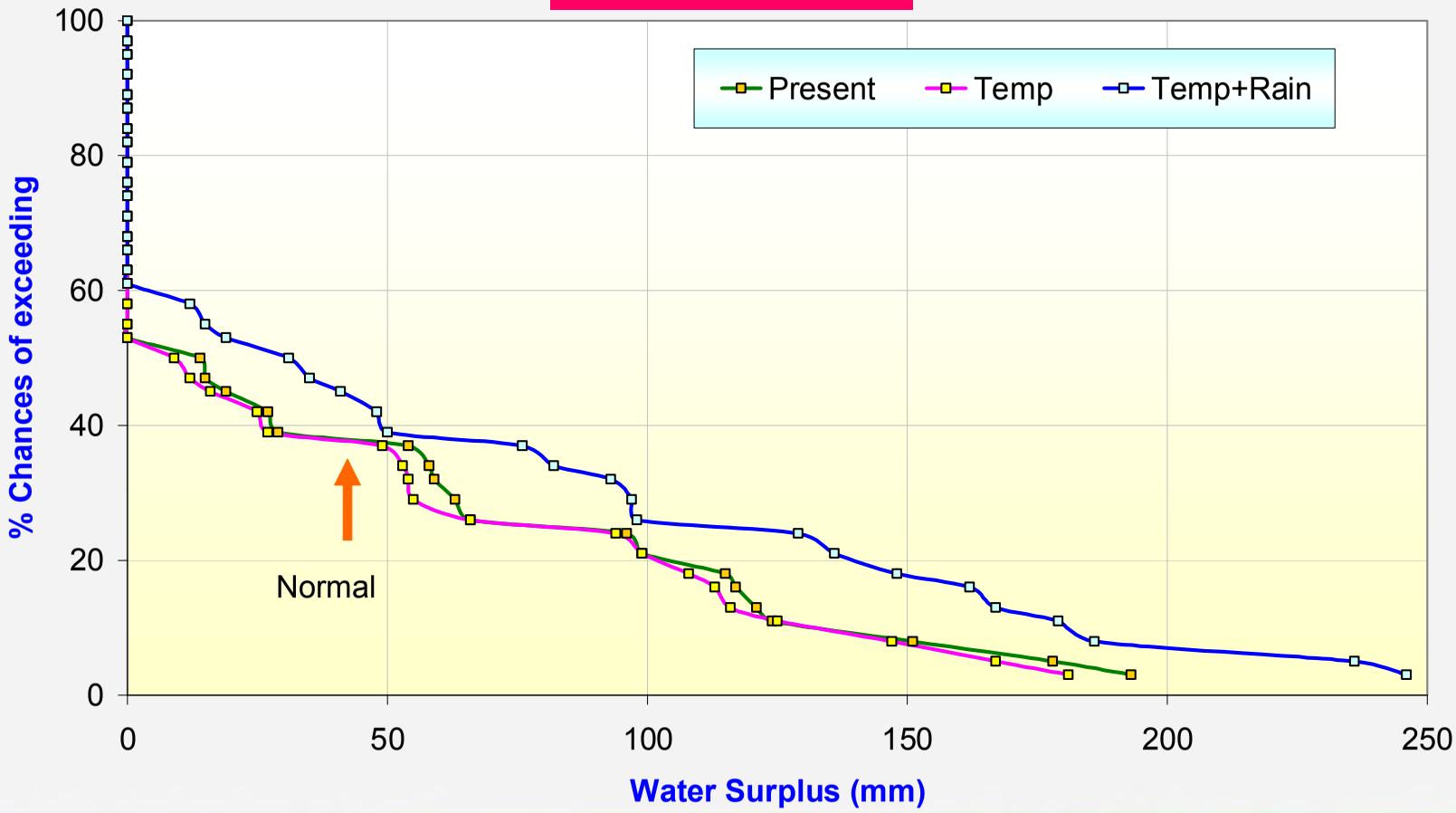


Climate change impacts on growing period Contd.



Climate change impacts on growing period Contd.

Water surplus



Summary

- IMA, suitable to delineate LGP; GIS as a tool
- End is more variable than begin and no definite relationship between begin and end
- Dry spells occur at various stages of crop growth
- LGP may shorten by 15 days due to climate change projections (delayed begin and early end)



Way forward

- LGP analysis relevance – Agroclimatic potential
- Delineation of areas with greater impacts thru climate change
- Crop growth simulation models for impact analysis for specific crops
- Shaking hands with other disciplines (IGNRM)



Thanks for your attention

