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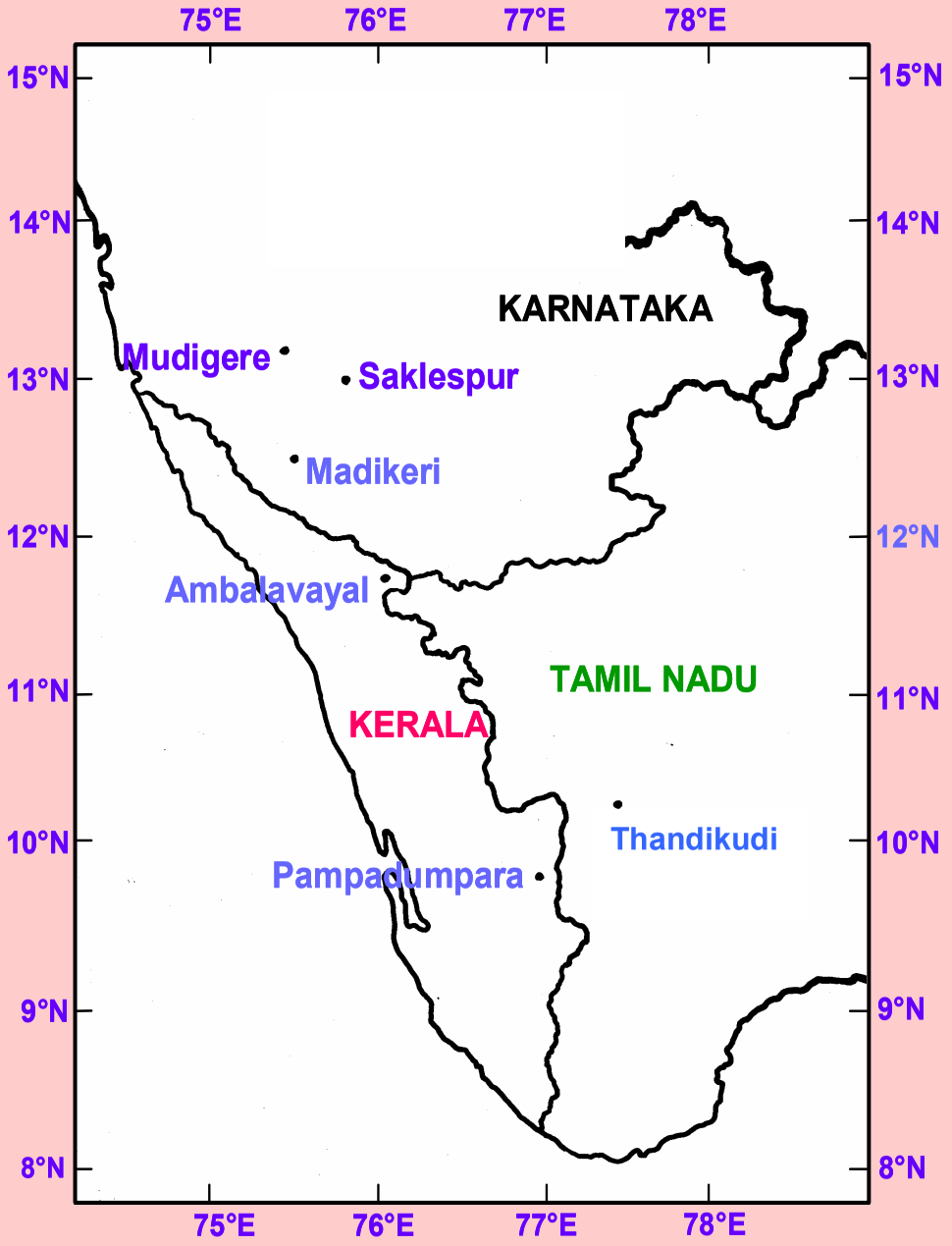
INFLUENCE OF MONSOON ON QUALITY OF COFFEE BEANS ALONG THE WEST COAST OF INDIA

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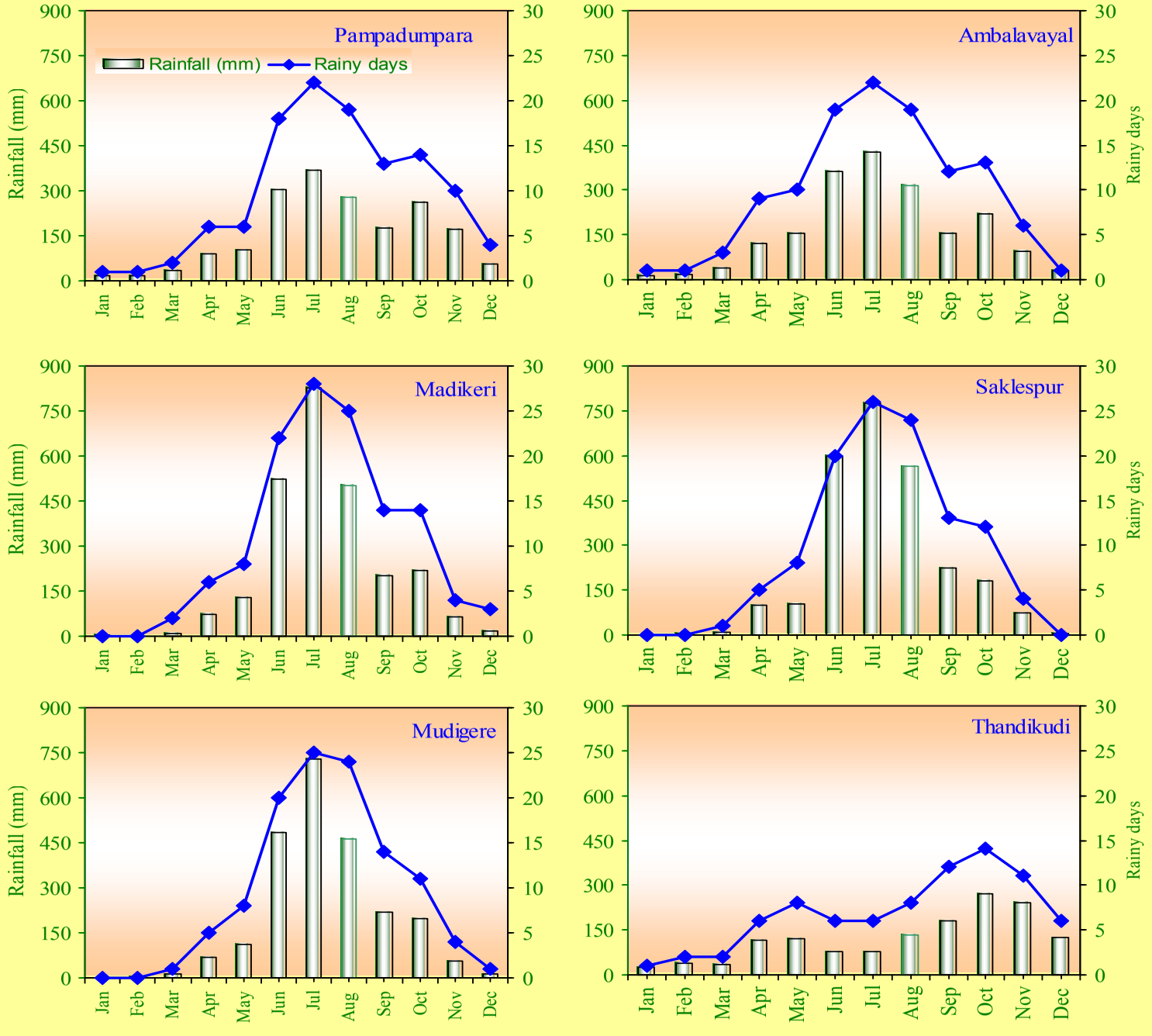
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Location map of coffee growing tract across the Western Ghats



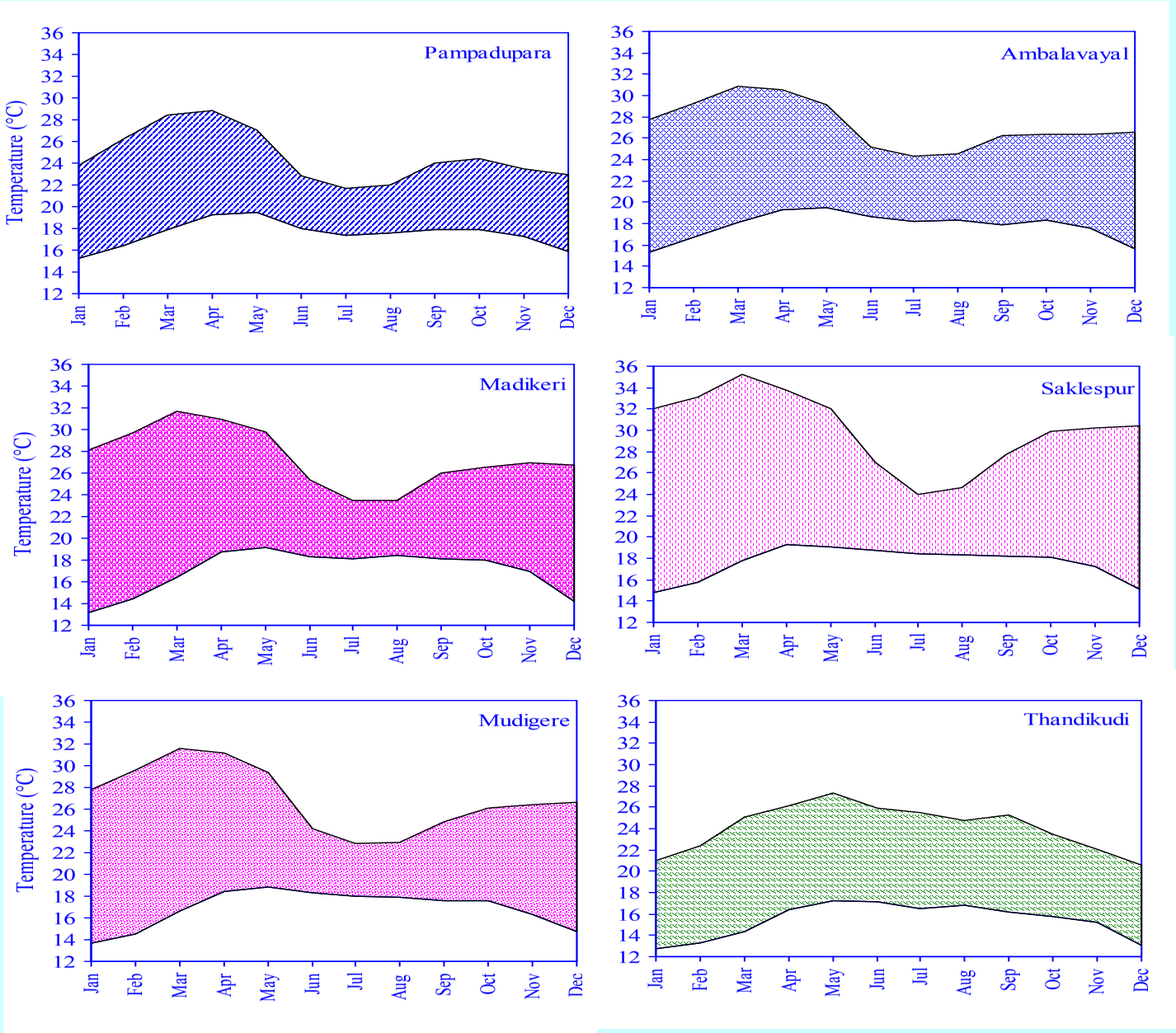
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Rainfall regimes of coffee growing tracts across the Western Ghats

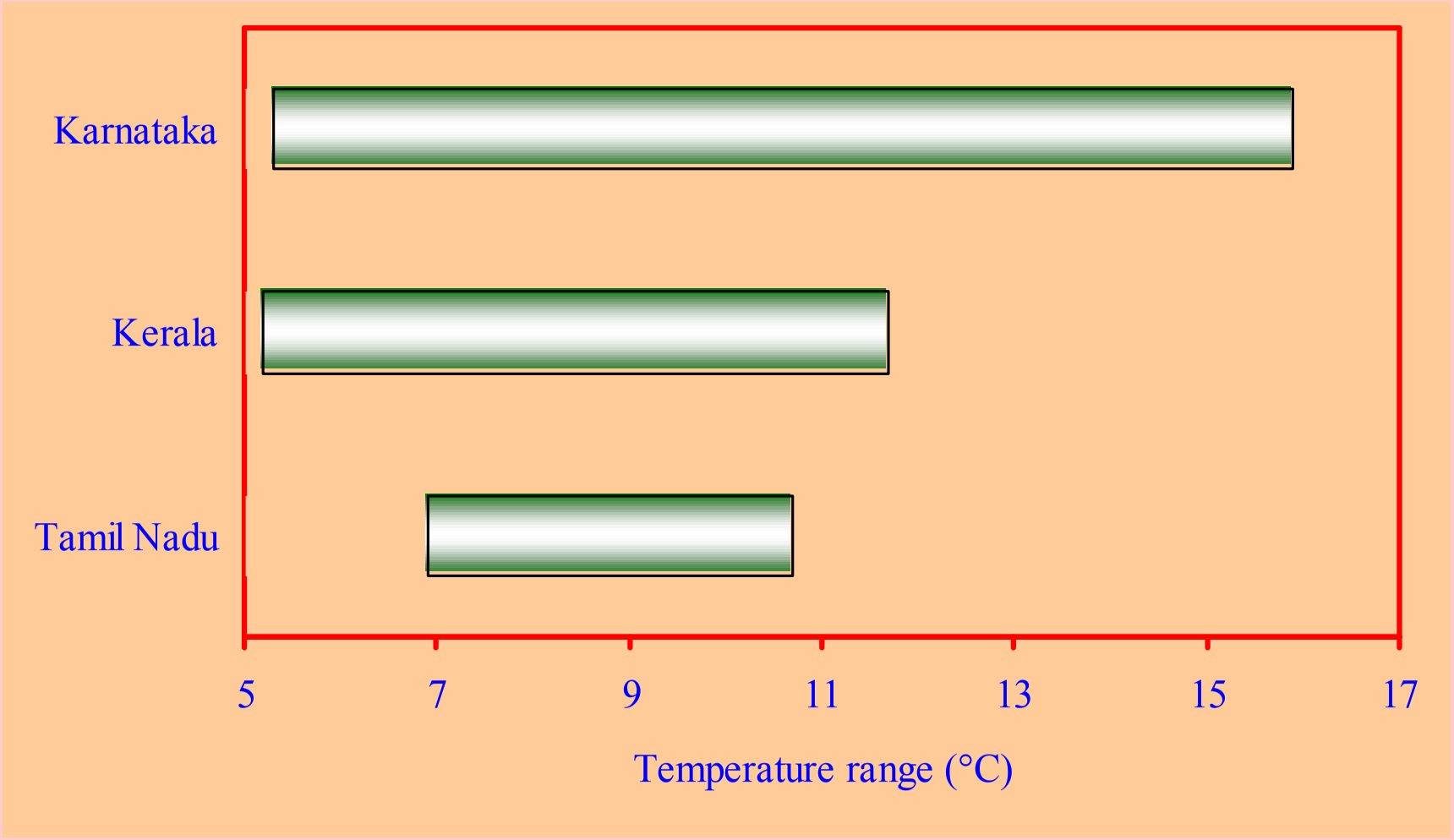


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Thermal regimes of coffee growing tract across the Western Ghats



Temperature range (°C) over the coffee growing locations

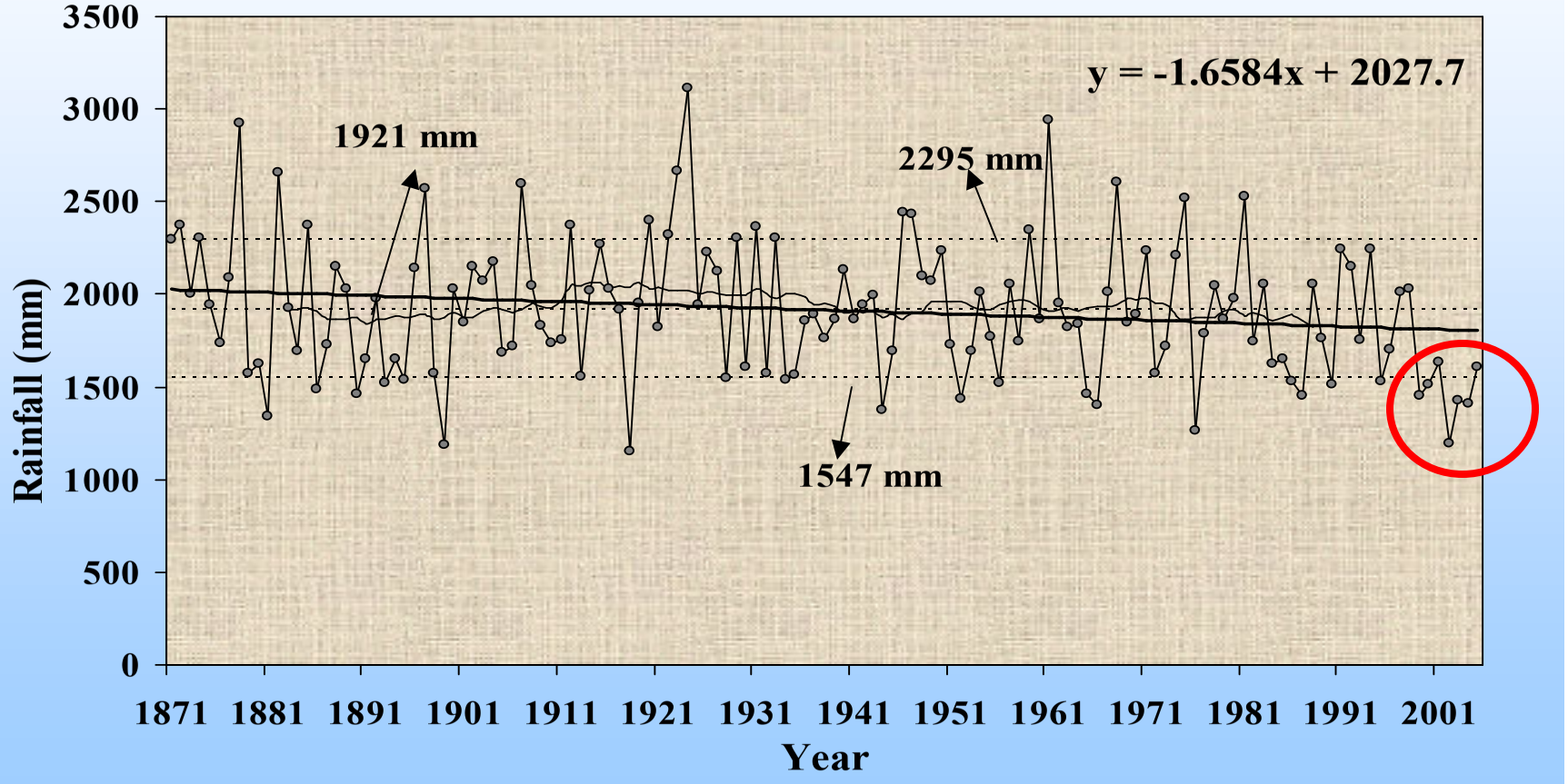


Weather effects on Arabica and Robusta across the Malabar Region

Climatic factors	Arabica	Robusta
Lack of blossom showers	Absence of rains in March – April	Absence of rains in March
Rain on opening day of blossom	Partial to complete failure	Partial failure
Hail storm	Injure the floral and Vegetative phase	Partial failure
Backing showers	Absent in May- poor crop set	Absent in April- poor crop set
Severe western exposures (with lowering of sub-soil-soil moisture)	Partial to complete	Partial to complete
Excessive wetness and waterlogging	Partial to complete	Partial to complete
Wind	Both are sensitive to wind disturbance	

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Southwest monsoon rainfall (mm) over Kerala from 1871 to 2005



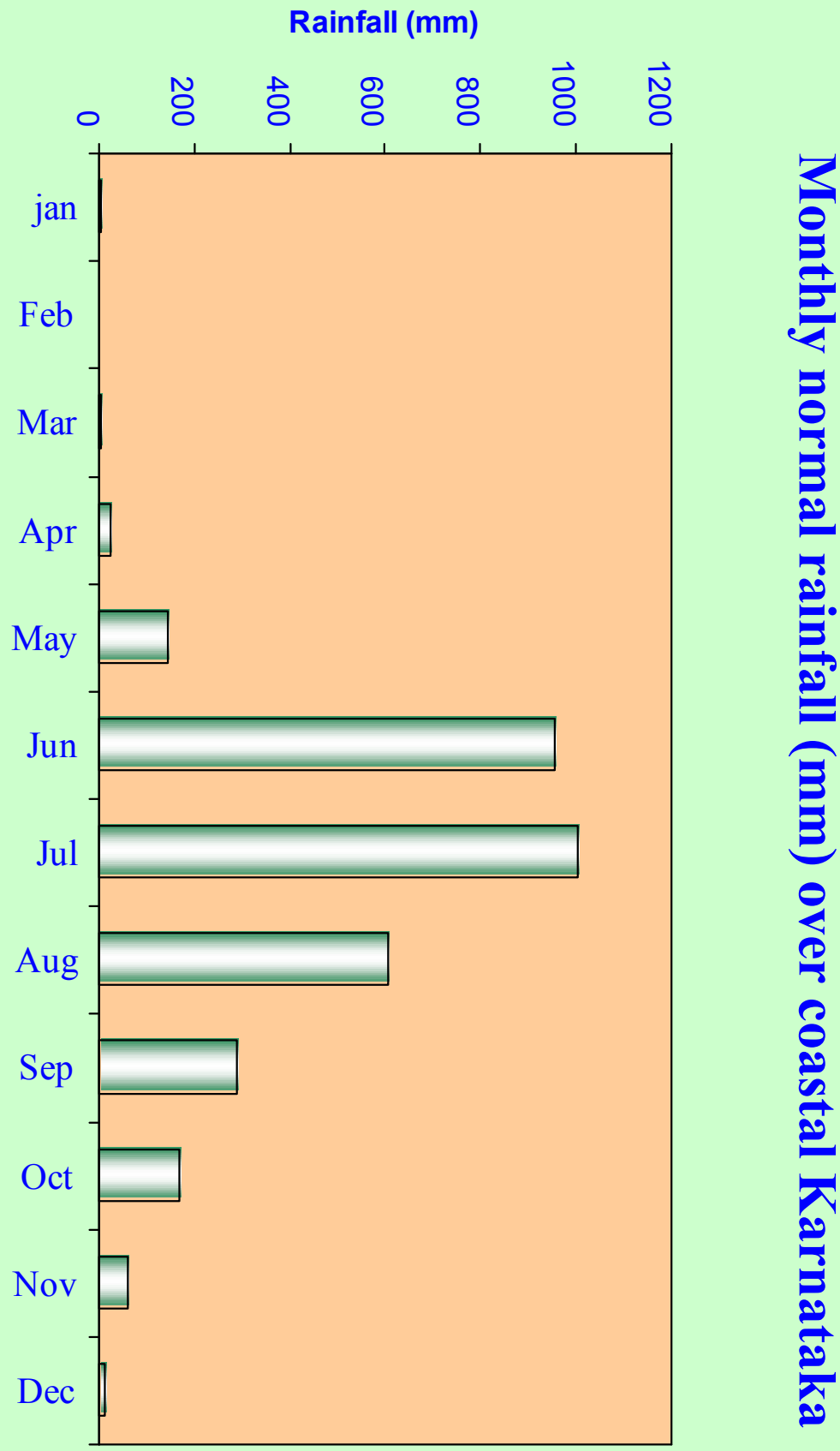
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All - India drought 2002

- The year 2002 was the first all-India drought year after a continuous spell of 14 good monsoons that followed the previous all-India drought year of 1987
- The seasonal rainfall (June-September) for the country as a whole was 19% below normal
- 29% area of the country experienced drought conditions with 19% area under moderate category and 10% under severe category
- July had the worst rainfall deficiency of 49%
- The all-India drought is defined as the drought year when the rainfall deficiency for the country as a whole is more than 10% of normal and more than 20% of the country's area is affected by drought conditions

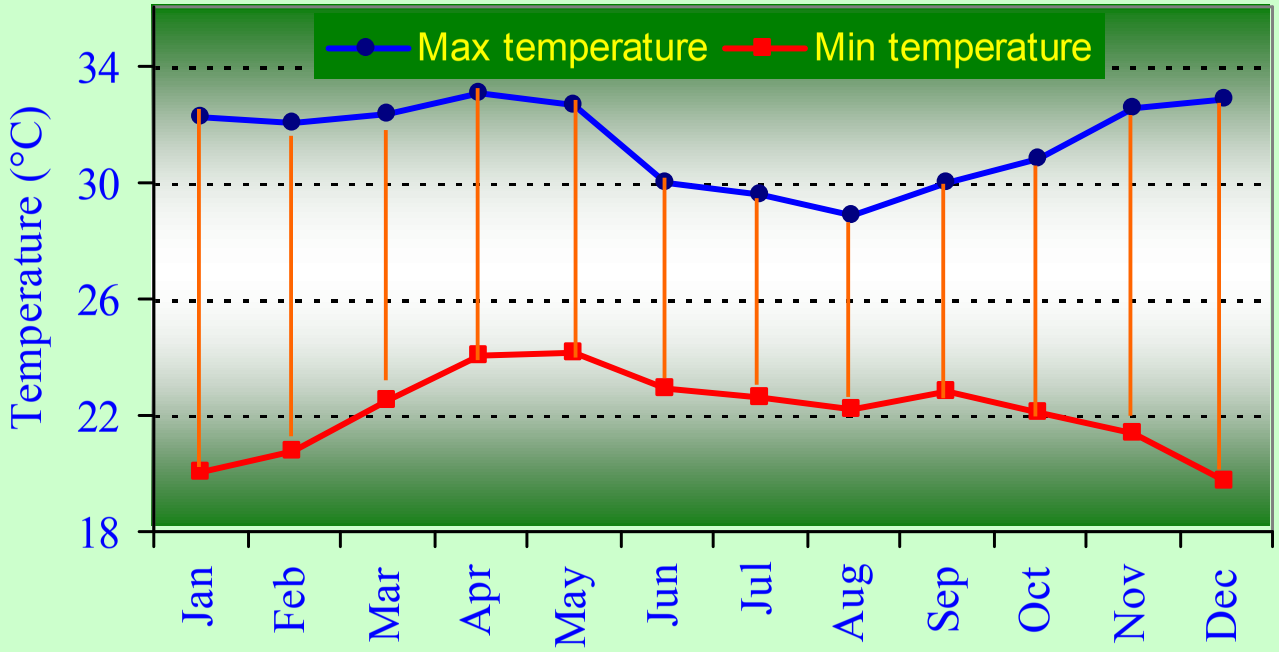
Deficit rainfall (%) in 2002 during the monsoon season over Kerala

Month	Rainfall (mm)		Percentage decline
	2002	Normal	
June	477	688	-30.7
July	266	641	-58.5
August	344	376	-8.5
September	105	226	-53.5
Southwest monsoon	1192	1916	-37.8



Monthly normal rainfall (mm) over coastal Karnataka

Monthly distribution of Maximum and minimum temperatures over coffee processing environments



Sorting and grading



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Automatic weather station at the curing yard





Ripe berries harvested

Processed through dry or wet method



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Sorting and grading



Bagging



Spreading



Final product



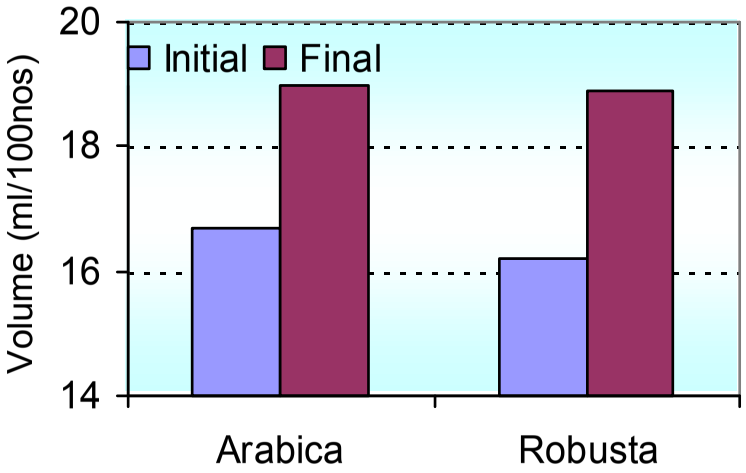
Volume of coffee (ml/100 nos) beans during monsooning

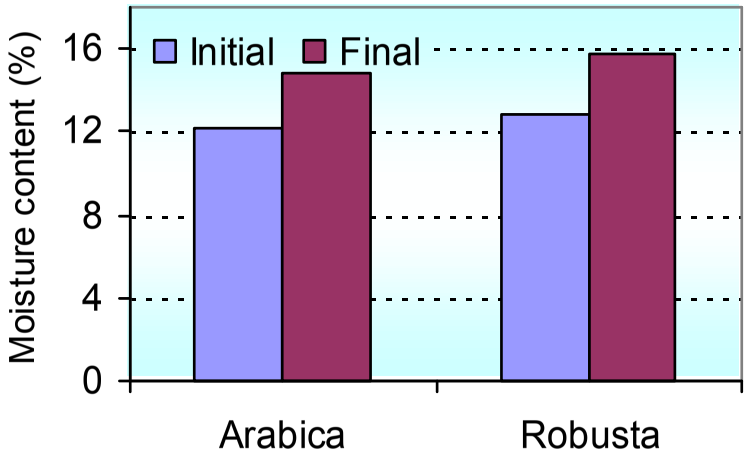
Year	Arabica			Robusta		
	I	F	D	I	F	D
2003	17.9	20.4	14.3	18.2	20.5	12.6
2004	15.0	17.4	16.0	15.4	18.6	20.8
2005	17.3	19.2	11.0	15.1	17.7	17.2
Mean	16.7	19.0	13.7	16.2	18.9	16.6

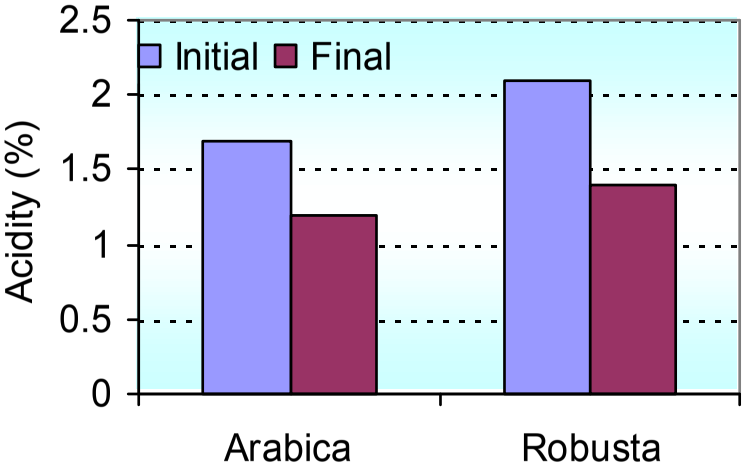
Moisture content of coffee beans (%) during monsooning

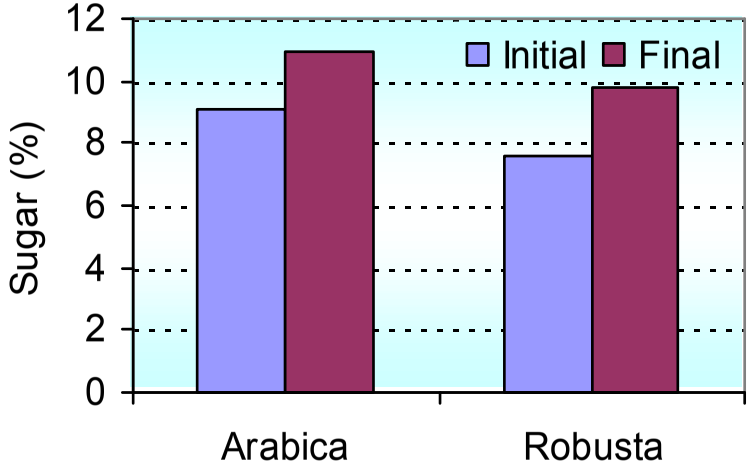
Year	Arabica			Robusta		
	I	F	D	I	F	D
2003	12.1	14.2	17.3	12.8	14.8	15.6
2004	12.3	14.4	17.1	13.2	15.7	18.9
2005	12.2	15.8	29.5	12.4	16.7	34.7
Mean	12.2	14.8	21.3	12.8	15.7	22.9

Physical and biochemical characters of Monsooned Malabar Coffee



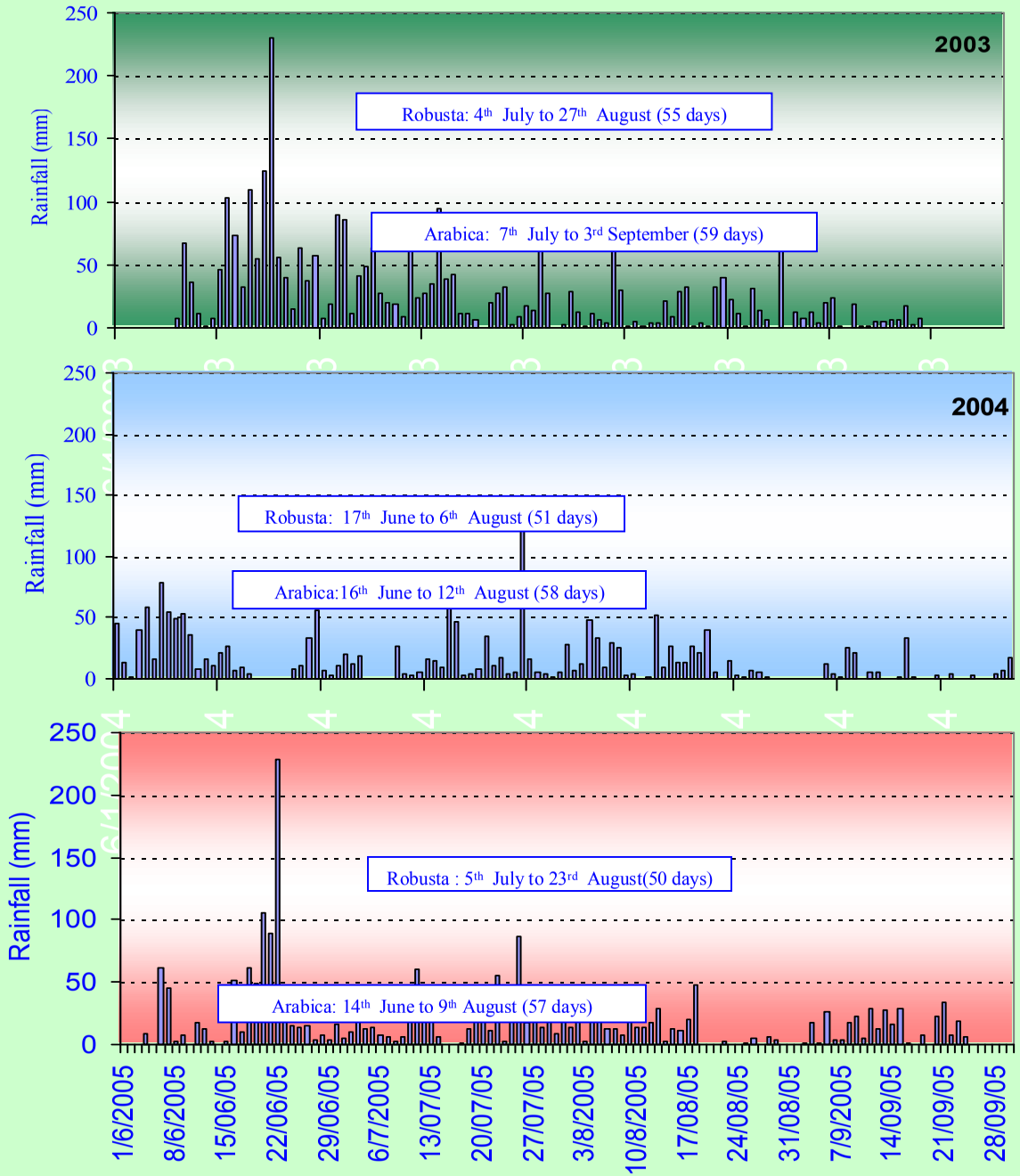






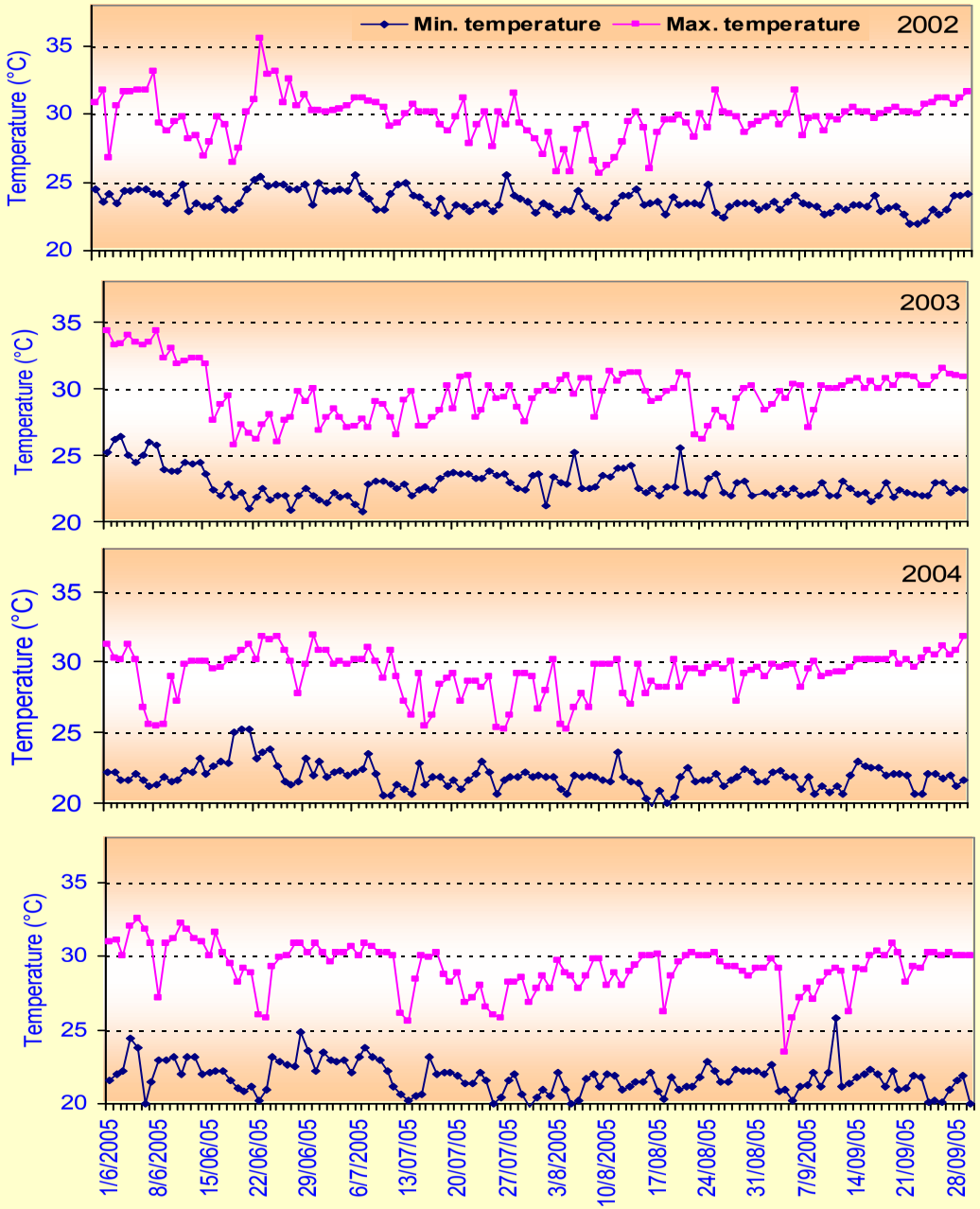
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Daily rainfall during monsoon season over coffee processing unit



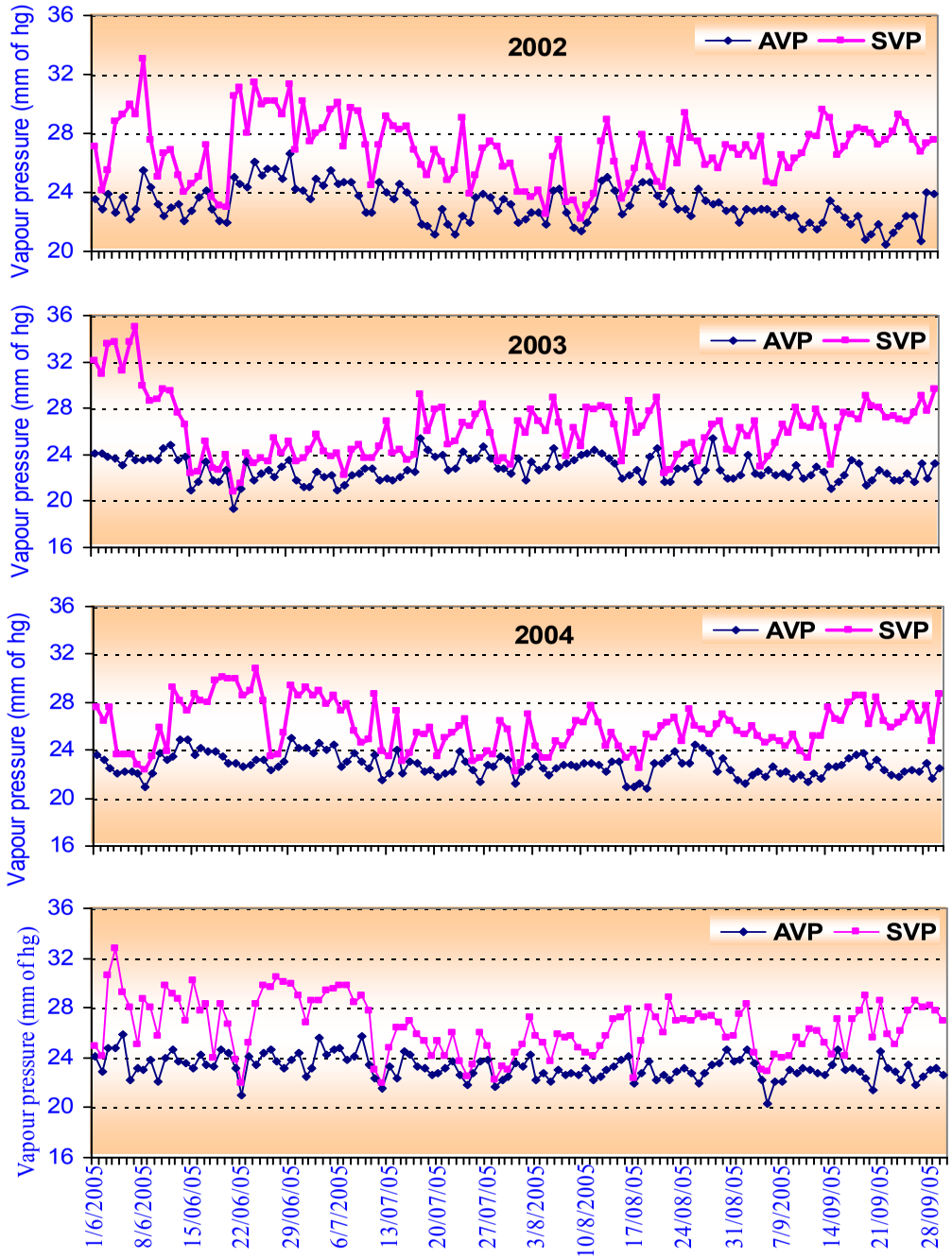
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Daily maximum and minimum surface temperatures during monsoon season over coffee processing unit



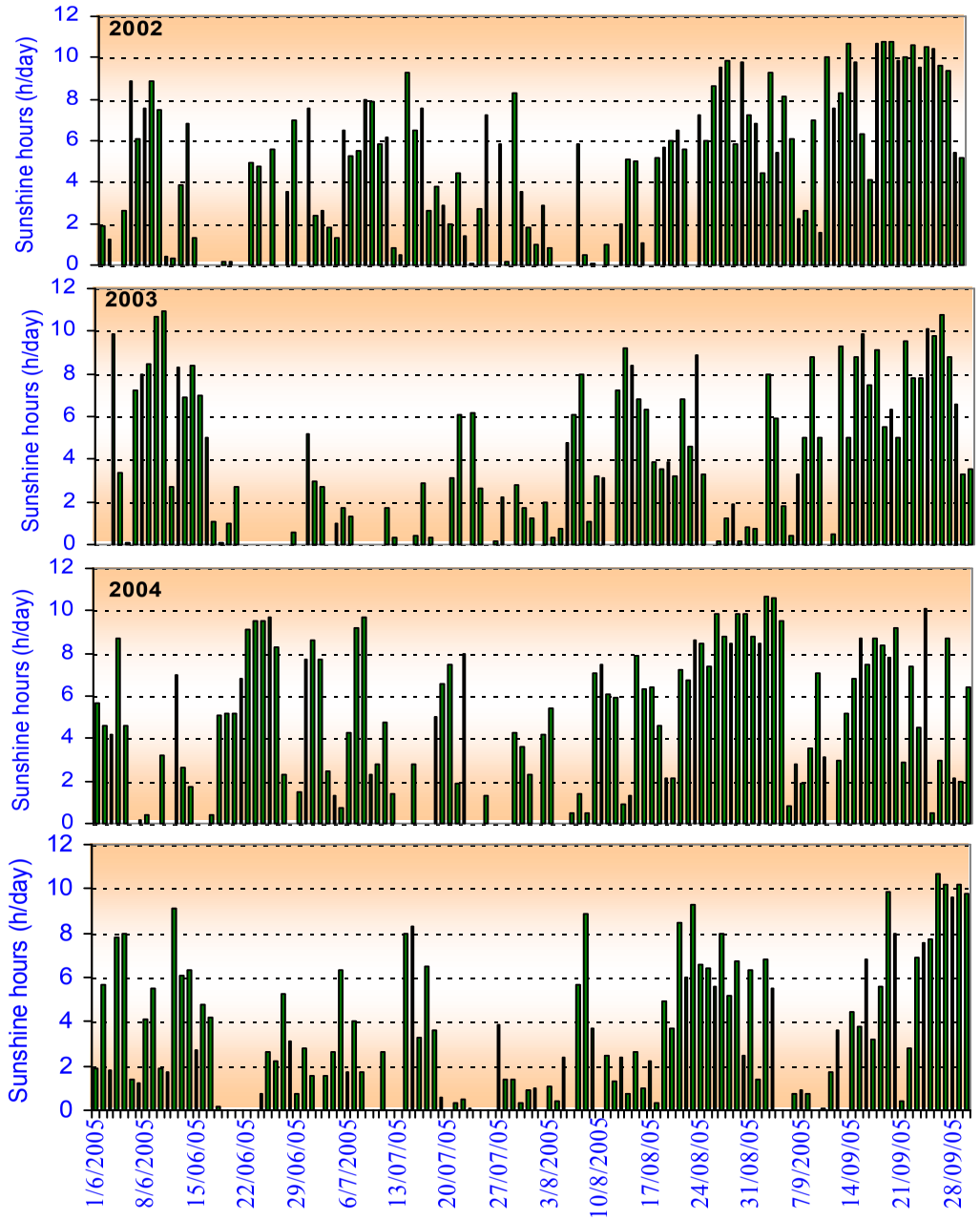
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Daily vapour pressure during monsoon season over coffee processing unit



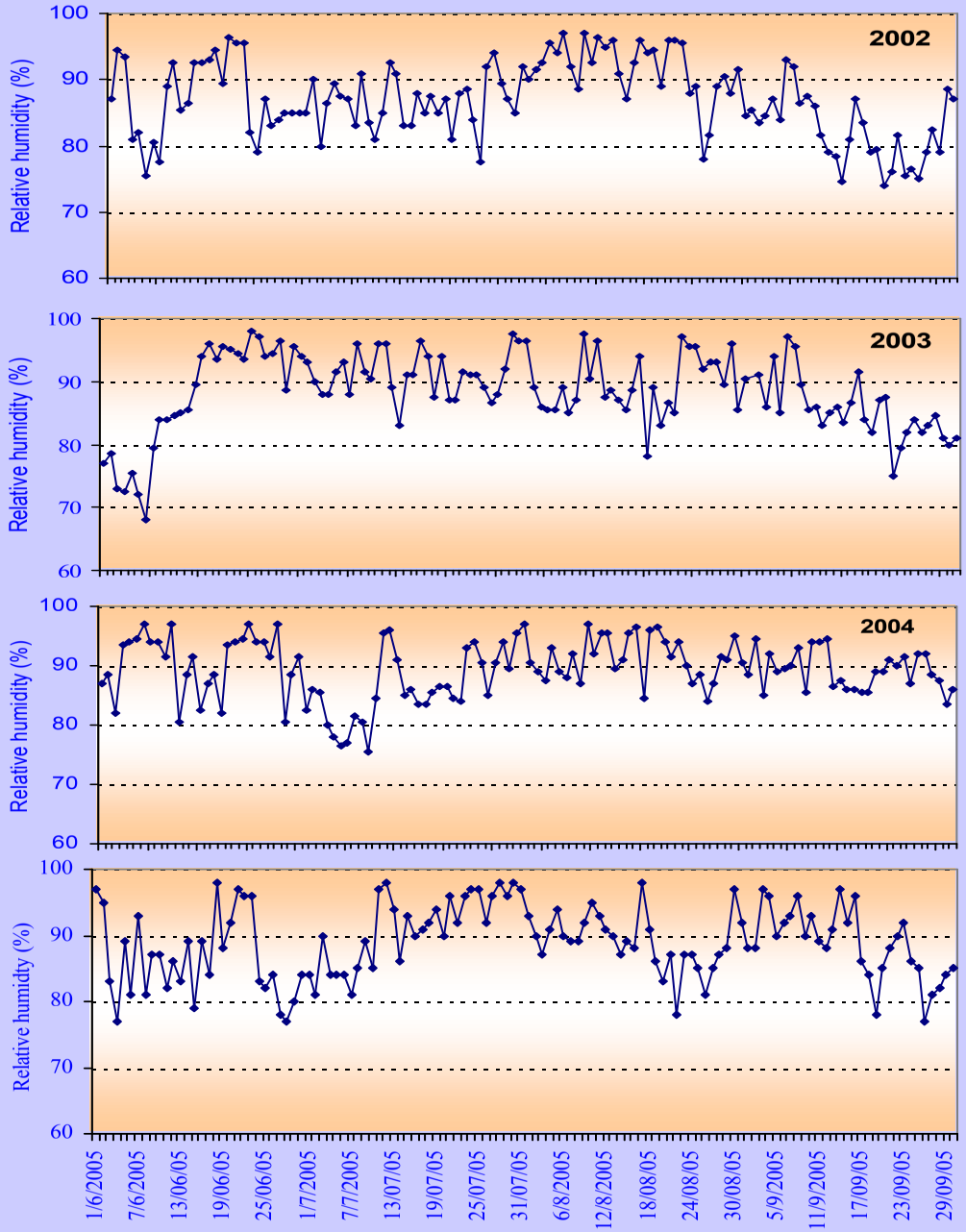
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Daily bright sunshine during monsoon season over coffee processing unit



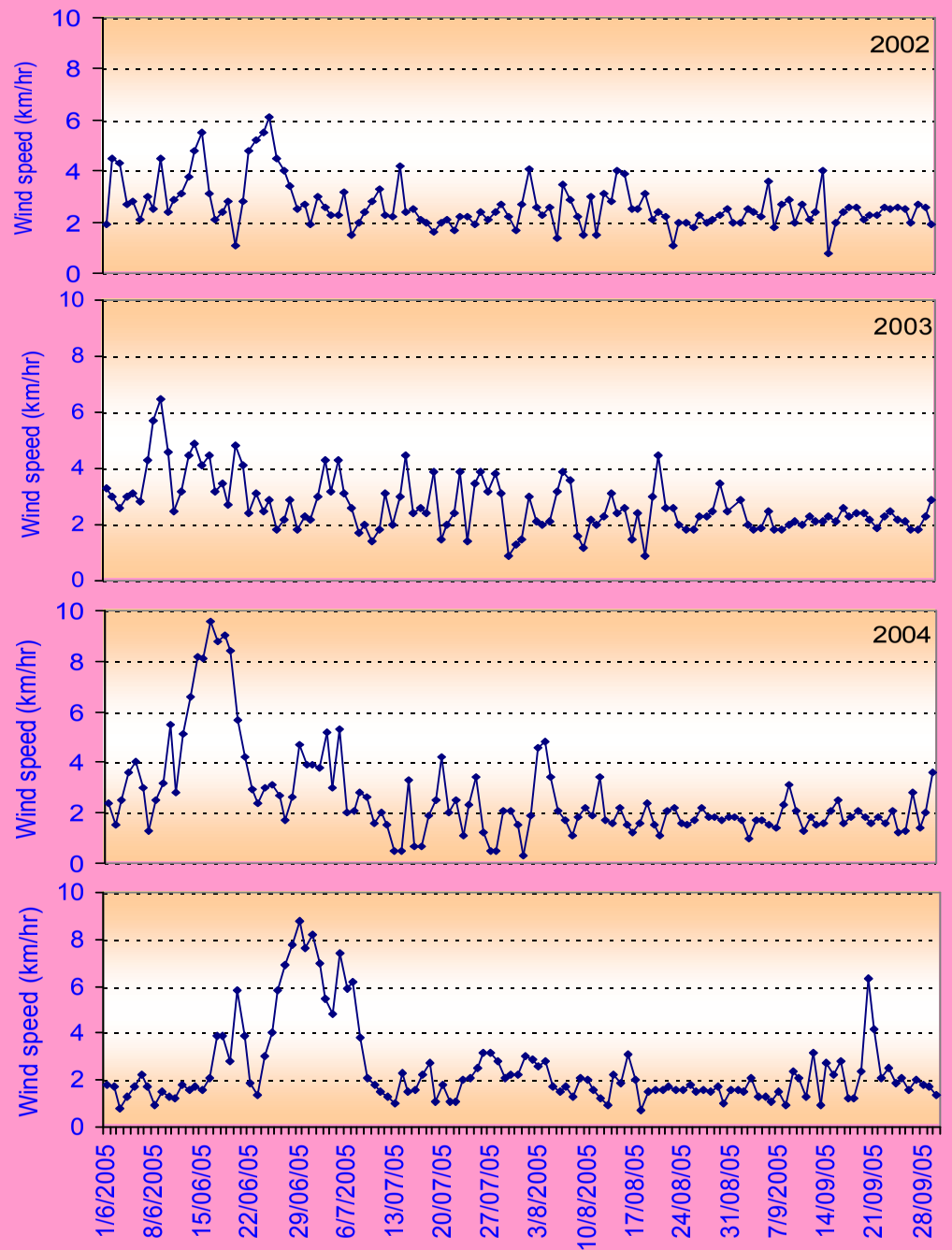
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Daily mean relative humidity during monsoon season over coffee processing unit



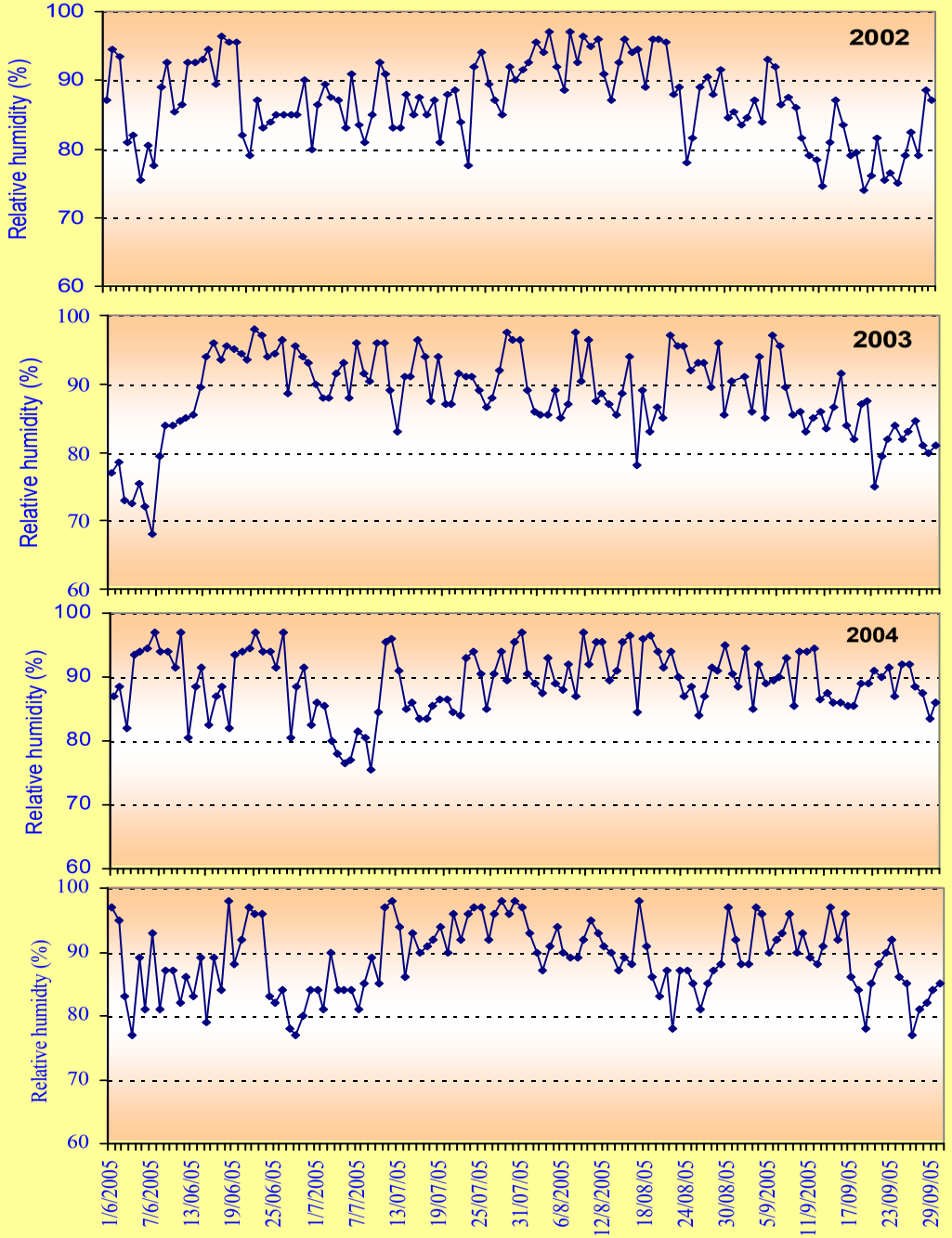
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Daily wind speed during monsoon season over coffee processing unit



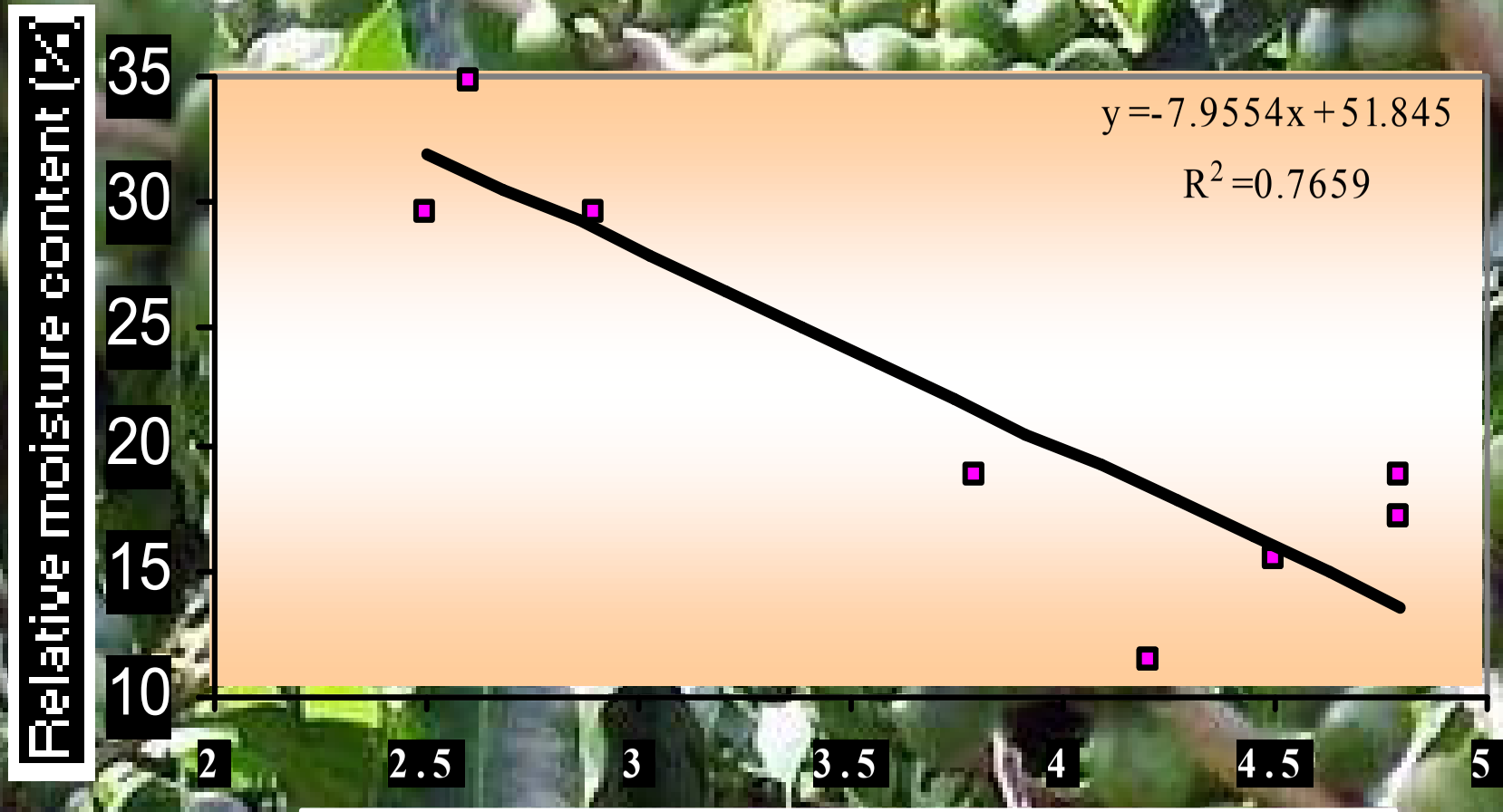
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Daily mean relative humidity during monsoon season over coffee processing unit



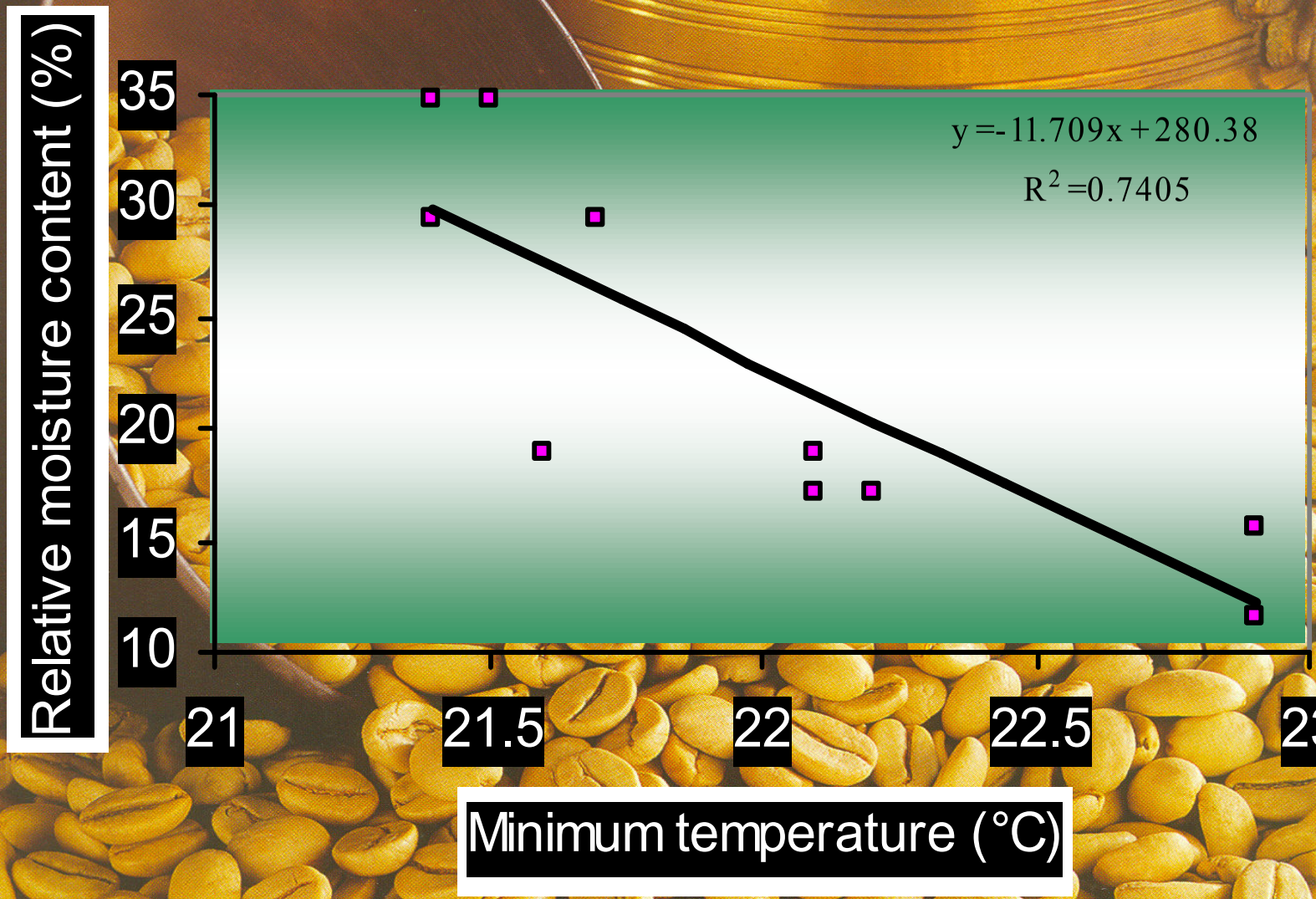
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Vapour pressure deficit versus relative moisture content



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Minimum temperature versus relative moisture content



Relationship between vapour pressure deficit, night temperature and moisture content of coffee beans

$$Y = 183.32 - 4.81662\ X_1 - 6.486X_2\ (R_2 = 0.87)$$

Where,

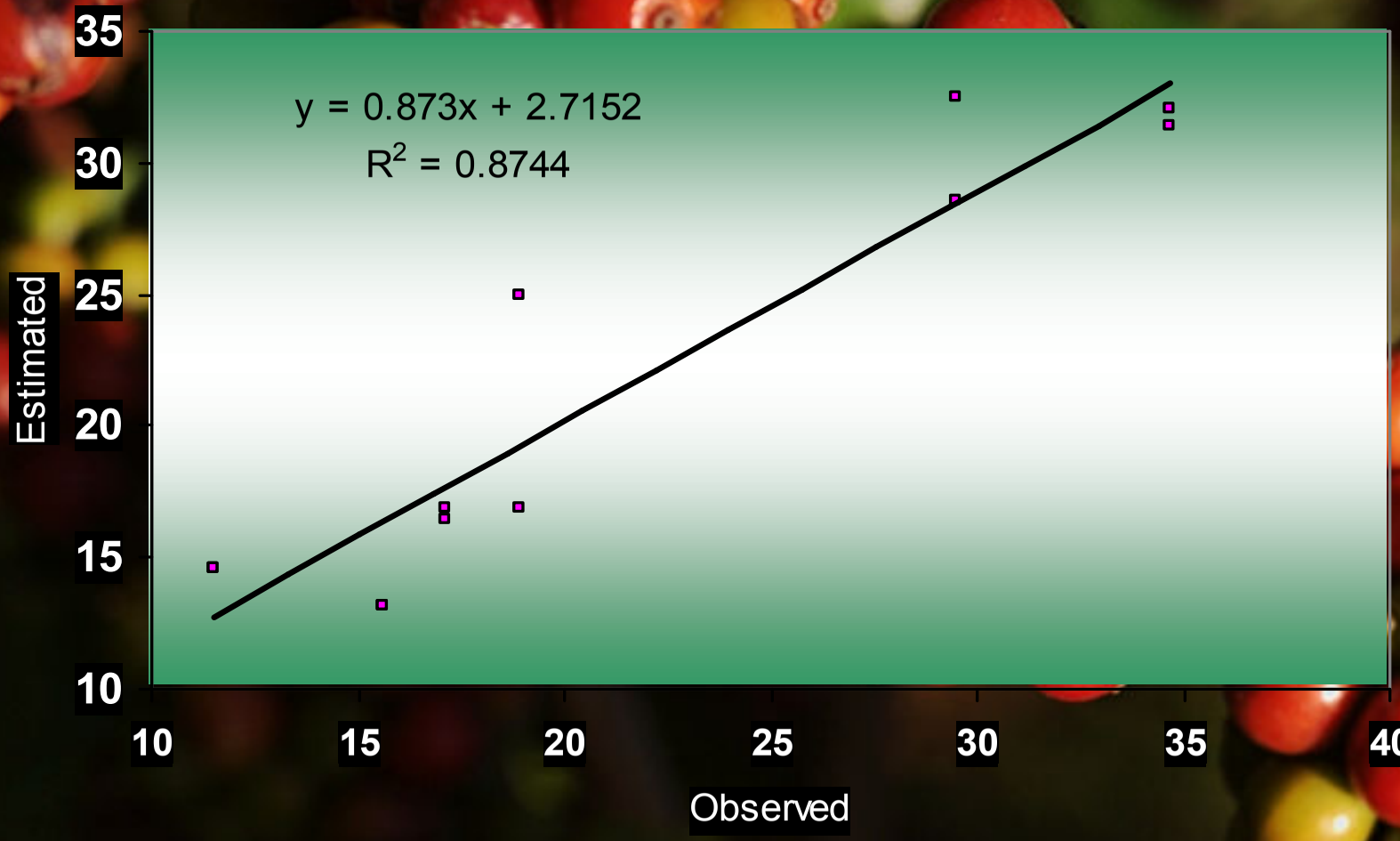
Y is moisture content of coffee beans

X_1 is vapour pressure deficit in the afternoon

X_2 is night temperature

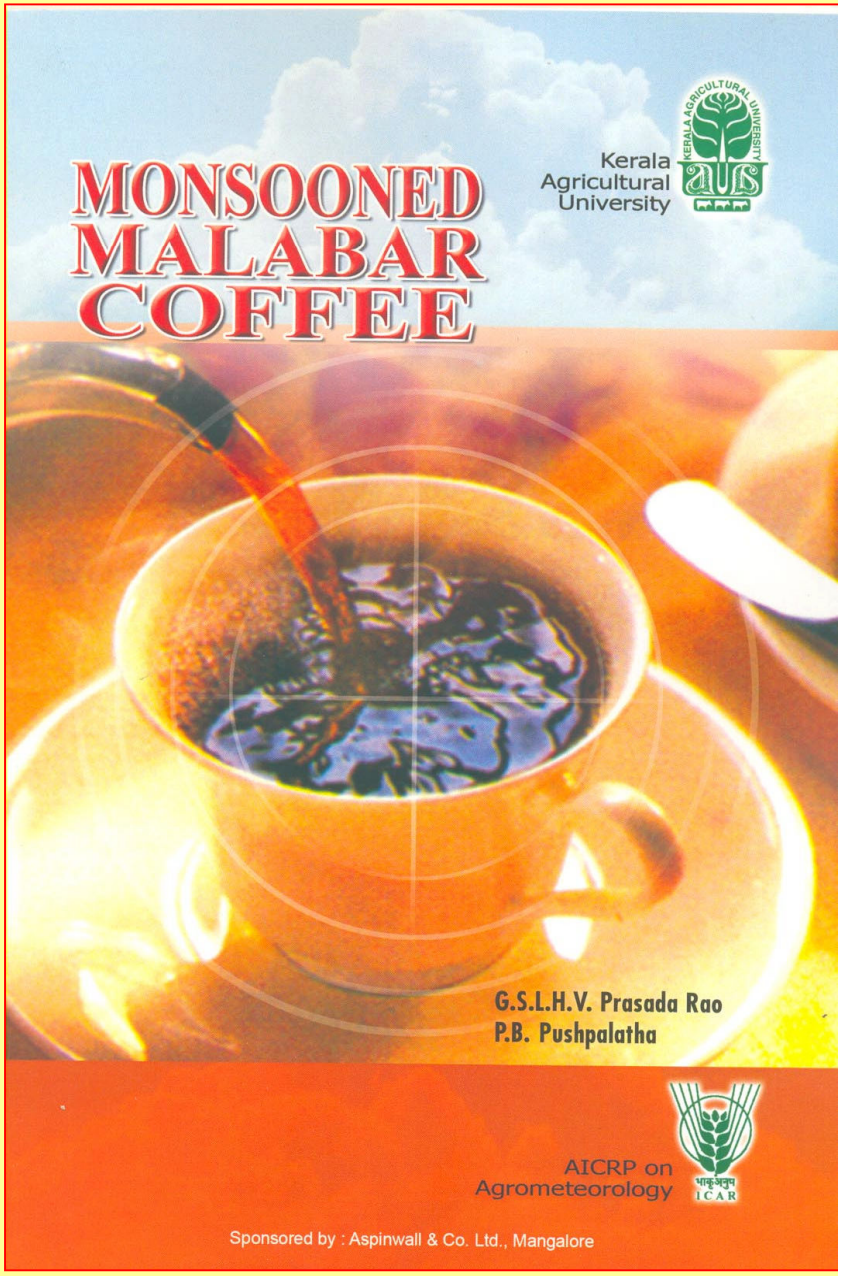
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Observed and estimated moisture content (%) in coffee bea



Conclusion

Continuous clouds with heavy rainfall and its better distribution, high atmospheric water vapour content, moderate surface air temperature and gentle sea breeze would lead to better moisture content in coffee beans if processed during the monsoon period. Probably, active monsoon period within the monsoon season may be more conducive for such processing of coffee beans. It is one of the factors leading to superior quality in addition to other genetical and environmental factors. Vapour pressure deficit and night temperature had significant relationship with moisture content of coffee beans.



Erratic monsoon affects coffee

EXPRESS NEWS SERVICE

Thrissur, Oct 17: Europeans would never have imagined that an erratic monsoon in a far-away tiny state called Kerala can upset their palate.

If bad coffee can spoil a day, some Europeans might be having a terrible spell for the last three years. Upset over the fluctuating taste and fortunes of a renowned variety of coffee called ,'Monsoon Malabar', an exporting firm that caters to Europe commissioned a team to study the reason.

Blame it on the monsoon, says the study which has conclusively proved that erratic monsoon lowers the quality of coffee. The pioneering study also points out that the erratic spells could have disastrous consequence on the economy of the state with decreasing production of pepper and cardamom.

G.S.L.H.V. Prasada Rao of the Agro-Meteorology department of Kerala Agricultural University (KAU) says that physio-chemical changes occur in the plants due to changes in the monsoon pattern. Acidity increases and sugar content gets lowered in coffee beans with changes in the rainfall during June and July, he said.

The coffee beans bulge with less rainfall and the quality suffers. In black pepper flowering gets affected while in cardamom the tillering is affected, he added.

Prasada Rao says that the annual rainfall in Kerala is more than 2800 mm, out of which 68 percent is contributed during the monsoon period from June to September.

June is the rainiest month of South Kerala while northern parts get more rain in July. The study says that for the past few years, the monthly rainfall in June and July is seen decreasing while it is increasing in August and September. The number of rainy days is also decreasing. Berry initiation and elongation also depend on the cloudy and overcast sky, which is getting rarer these days, he added.

Studies done by KAU also point out a sharp increase in maximum temperature and low atmospheric water vapour content.

The studies were conducted over three years in Idukki and Wayanad. Mortality rate of pepper vines was found as high as 40 percent while cocoa is also seen suffering quantity-wise. The changes in the monsoon pattern were seen as slow but irreversible and could change the socio-economic structure of the region. Luckily tea, cashew and coconut were not affected by the changes.

Monsoon adds flavour to Malabar coffee

BY TIKI RAJWI

T'Puram, June 10: What goes into the making of good Monsooned Malabar coffee with its distinctly rich, smooth flavour? A perfect monsoon, for one, says a study.



The study, by the Agricultural Meteorology Department of the Kerala Agricultural University (KAU), tested factors that yield good Monsooned Malabar, a speciality coffee wooed by the international coffee market for its 'different' flavour.

"Apart from good monsoon, factors such as sea breeze, humidity, temperature and moisture content in the beans also are involved" said G.S.L.H.V. Prasada Rao, the department head and principal investigator of the study.

But the important ingredient is the good, smooth monsoon. "Monsoon has been aberrant during the past decade. So we got a lot of dryness, which is bad for the Monsooned Malabar," he said.

The study spanned three years from 2003 and was commissioned by the coffee industry after a crisis hit the Monsooned Malabar in 2002, when the flavour was not found up to the mark.

'India's own baby' in the coffee world is a variety of high-roast Arabica coffee bean grown in the Malabar. Its origin dates back to the times when native coffee beans were shipped to Europe. Damp holds of the sail ships and the humidity partially spoiled the beans, which turned a pale yellow. It soon became a rage in Europe, especially the Scandinavian countries.

Today, processed beans are exposed to moisture-laden monsoon winds to 'rig' the same effect. 'Monsooning' gives the beans more 'body,' and cuts down the dry acidic sensation.

"We found that a gentle sea breeze ranging between three-six kms is needed throughout the day, as the processing units are on the coasts," Prasada Rao said. Water vapour content in the air should be very high, more than 95 percent, but temperature should be moderate, ranging between 24 degree celsius to 30 degree celsius. All this blended with other ingredients such as sugar content, acidity levels give Monsooned Malabar its distinct flavour. "We are talking about black coffee which is preferred in Europe."

And if it's your perfect monsoon, the sugar content will be at optimum-level, giving a better taste to the coffee.


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