APPENDIX A

Microclimate of Lichen Habitats in Various Forest Types at KYNP

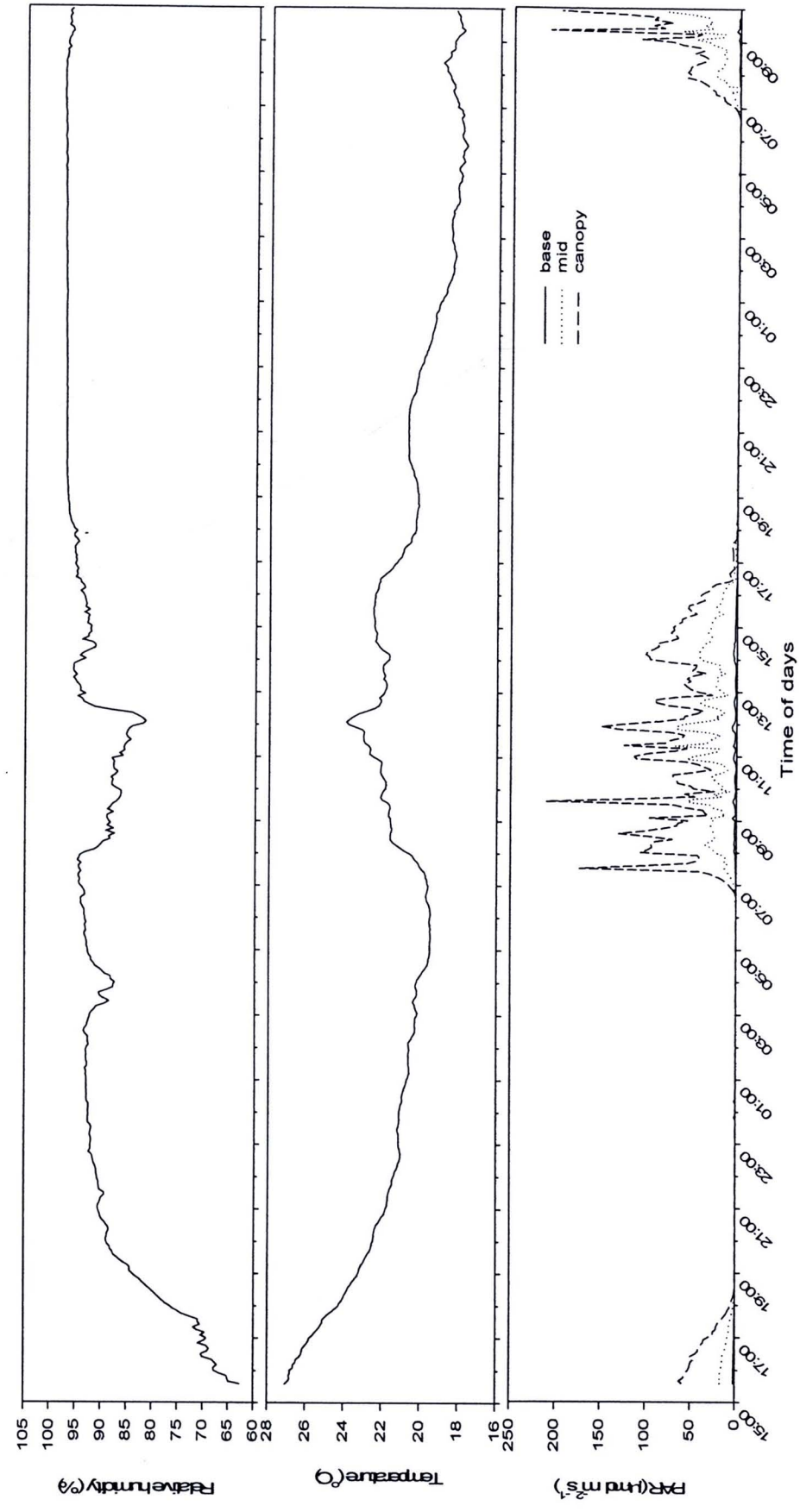

Figure 70 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 4-6 February 2004

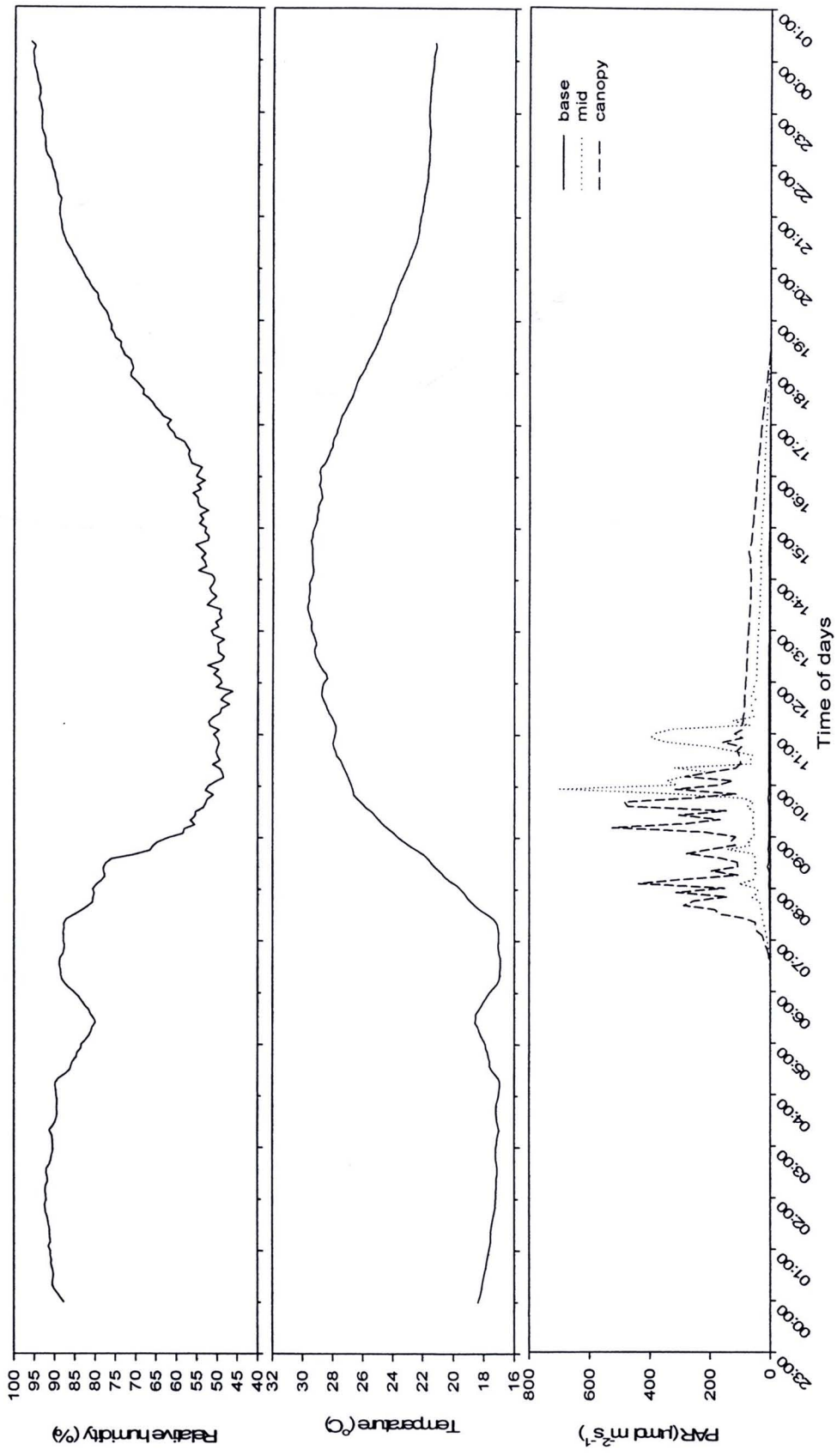

Figure 71 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded in 11 March 2004.

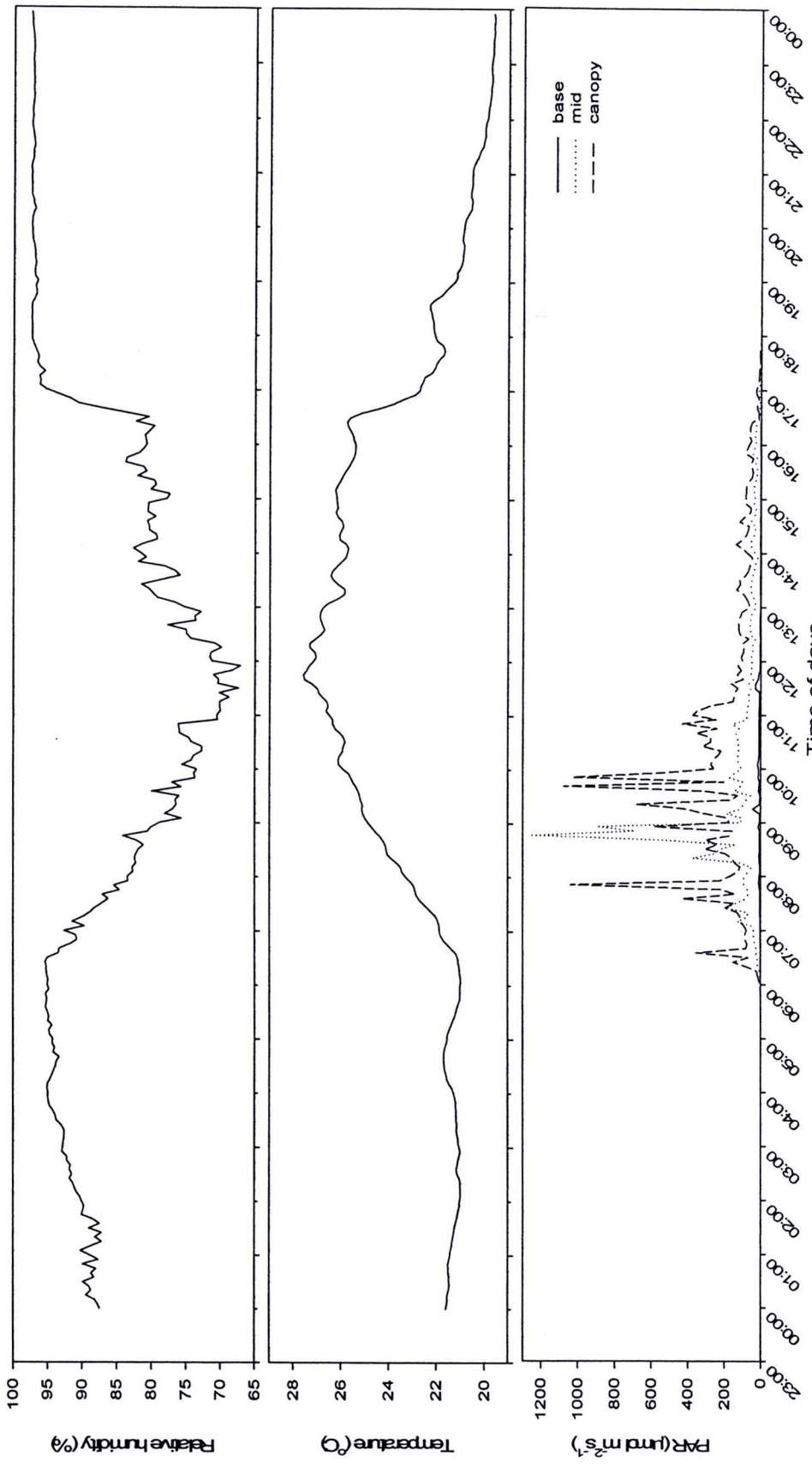

Figure 72 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded in 13 May 2004.

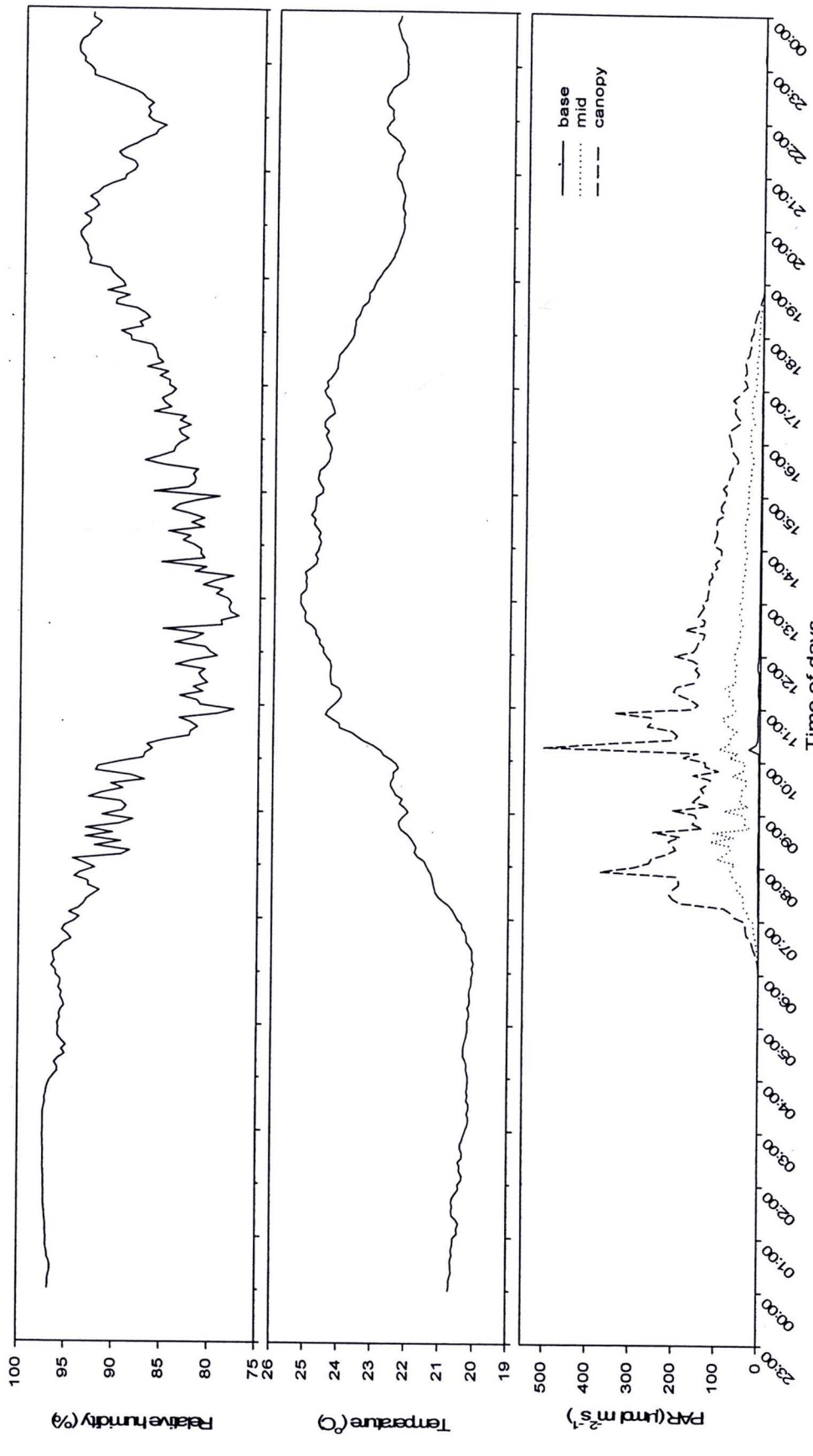

Figure 73 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded in 20 July 2004.

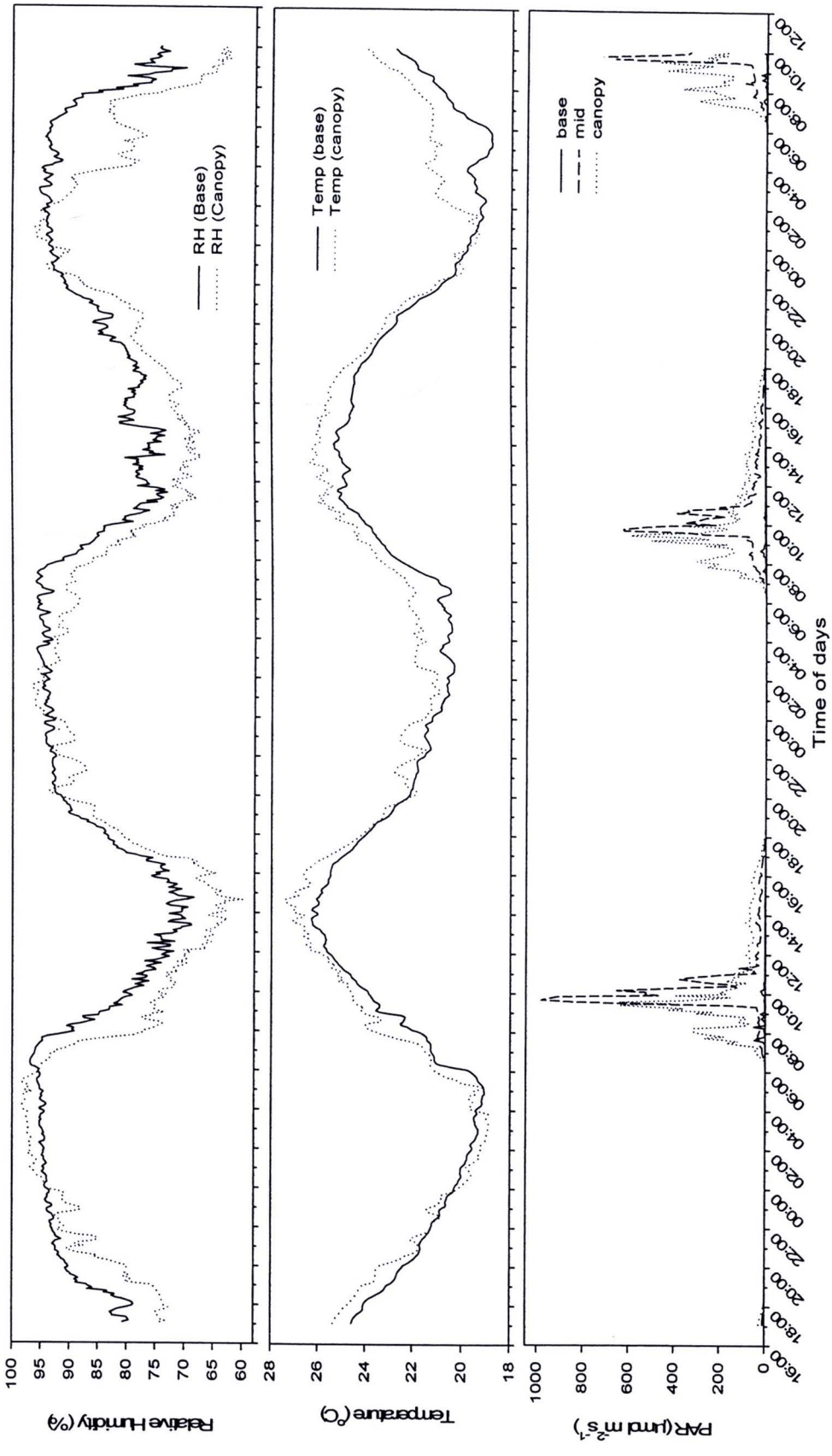

Figure 74 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 25-28 August 2004.

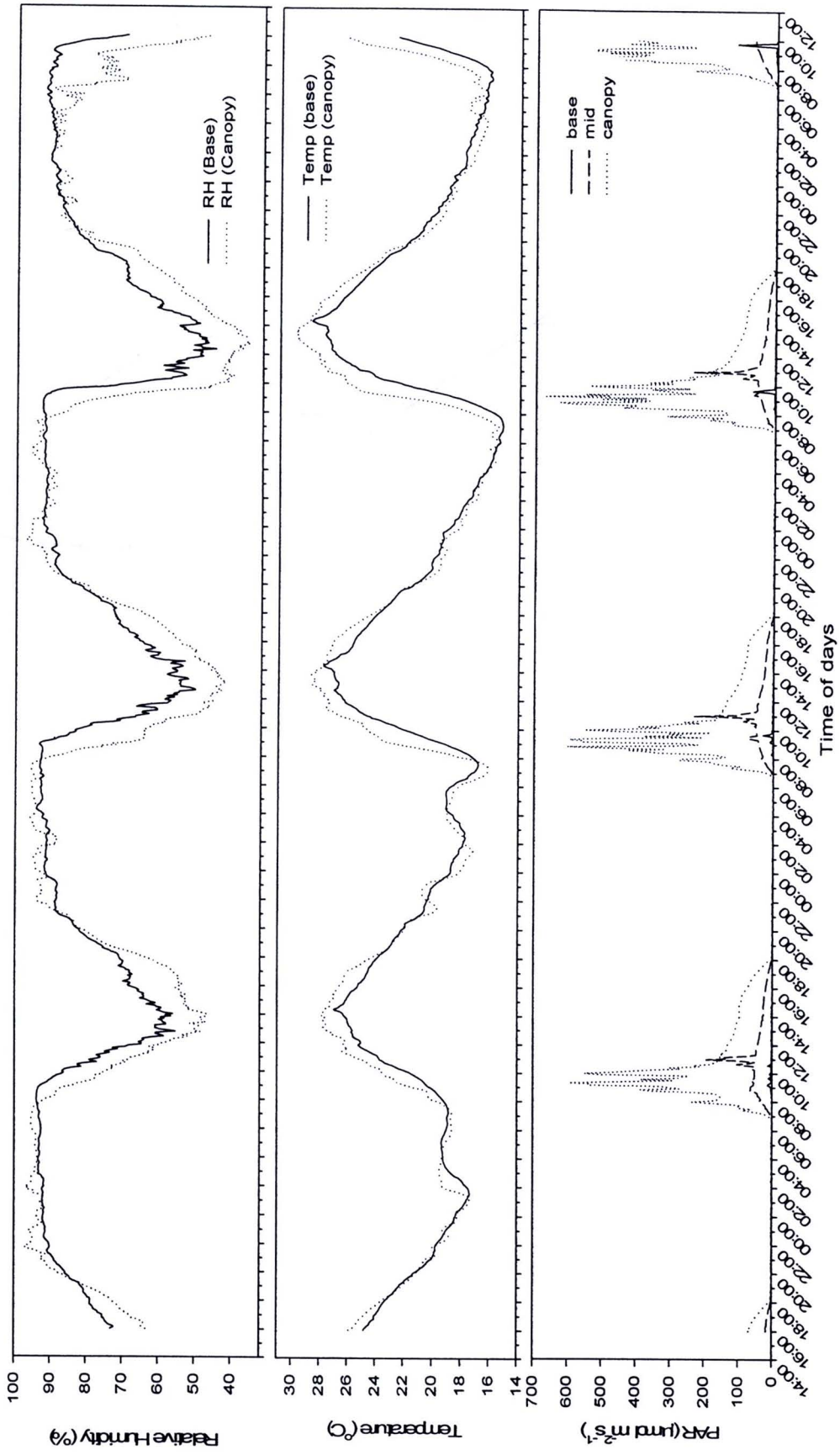

Figure 75 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 26-30 January 2005.

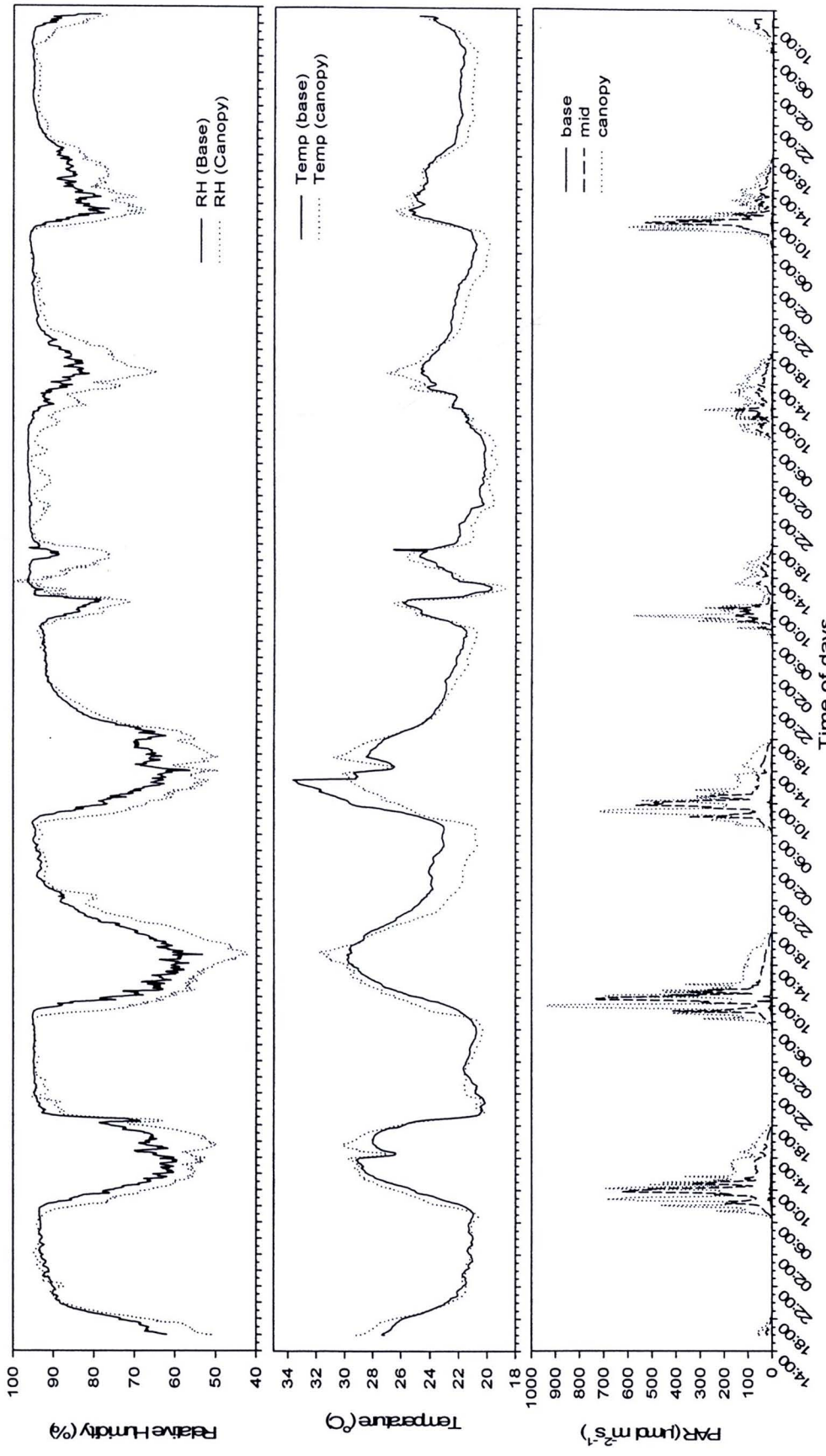

Figure 76 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 20-27 March 2005.

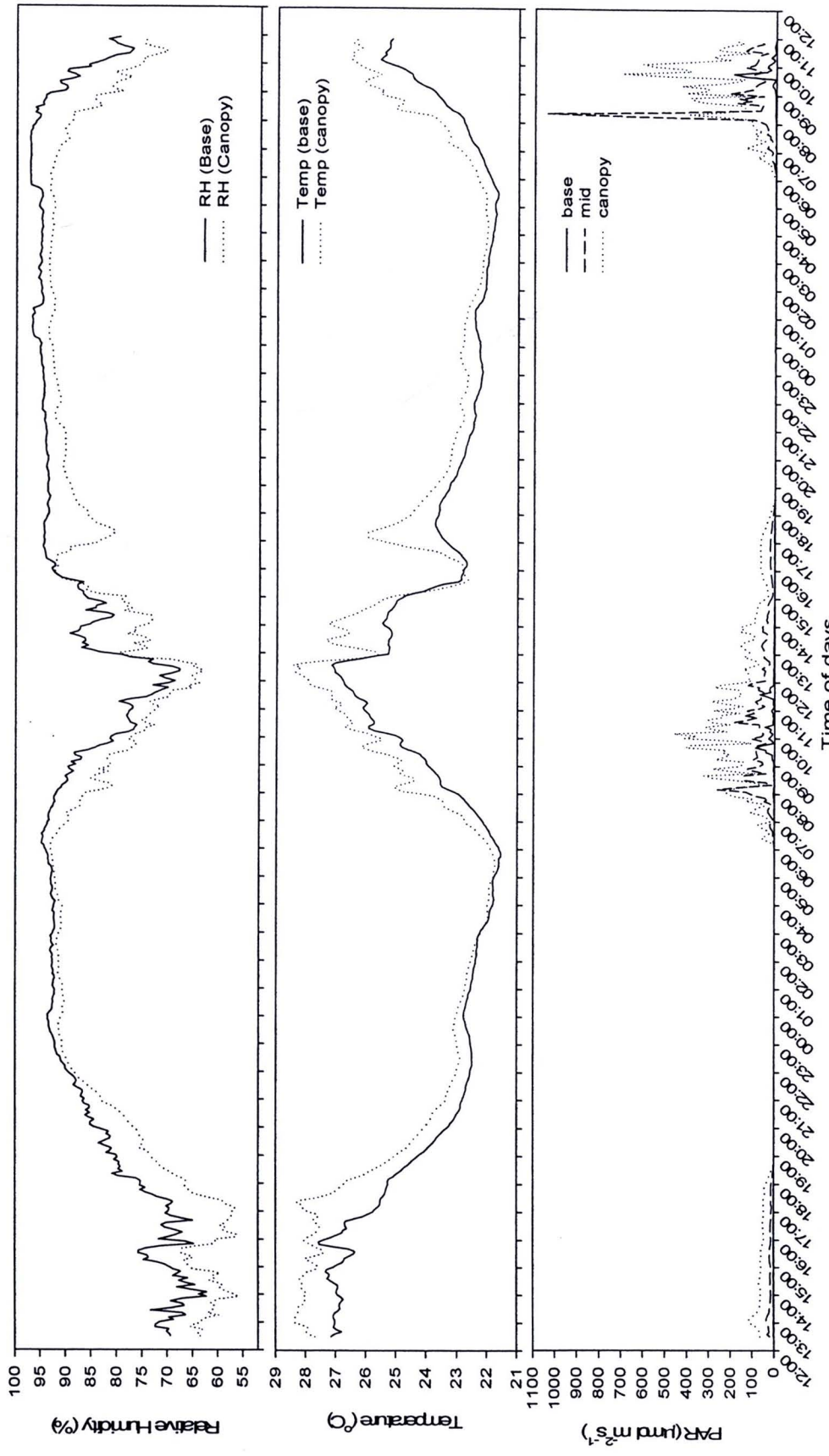

Figure 77 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 22-24 May 2005.

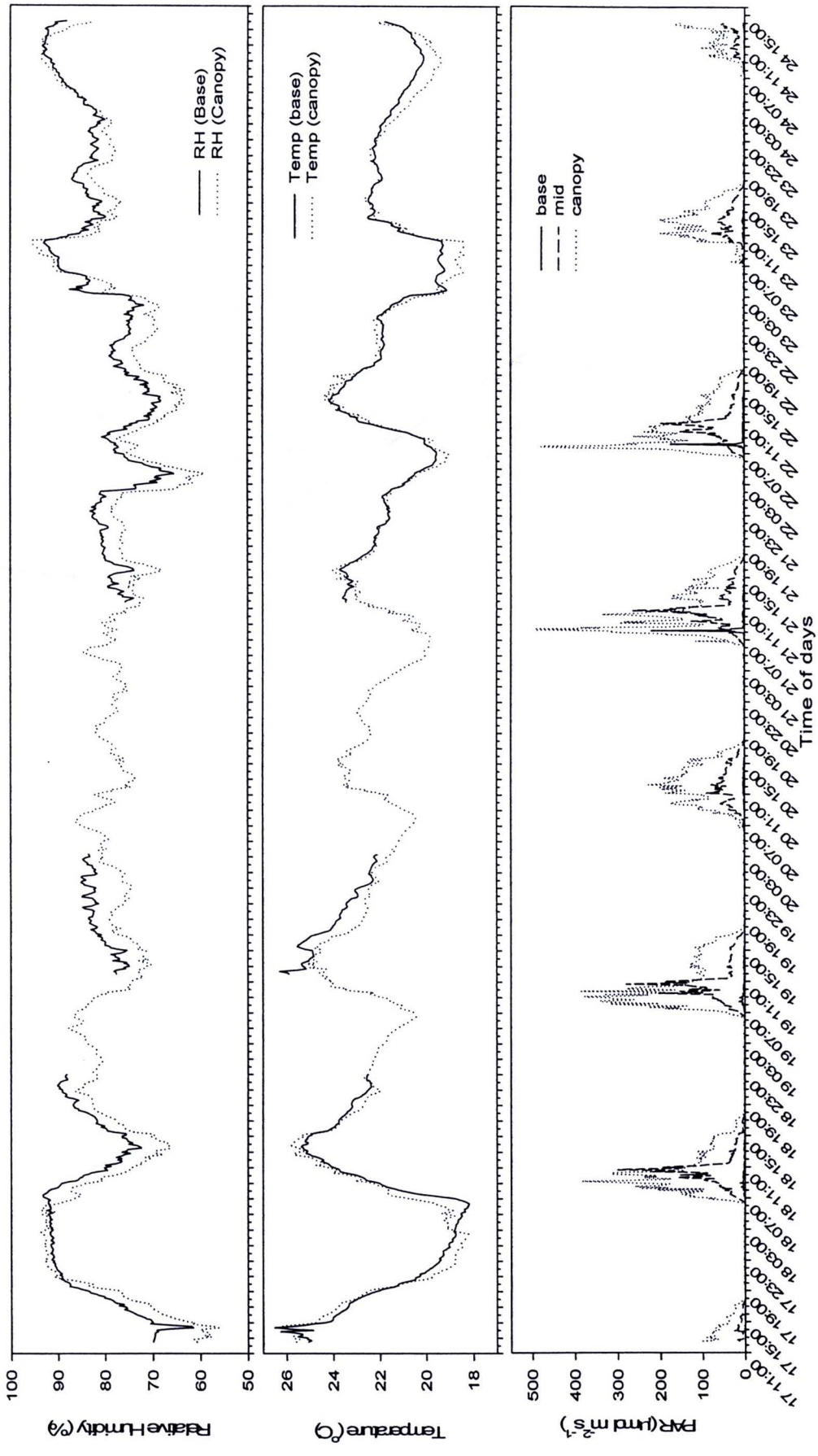

Figure 78 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 17-24 October 2005.

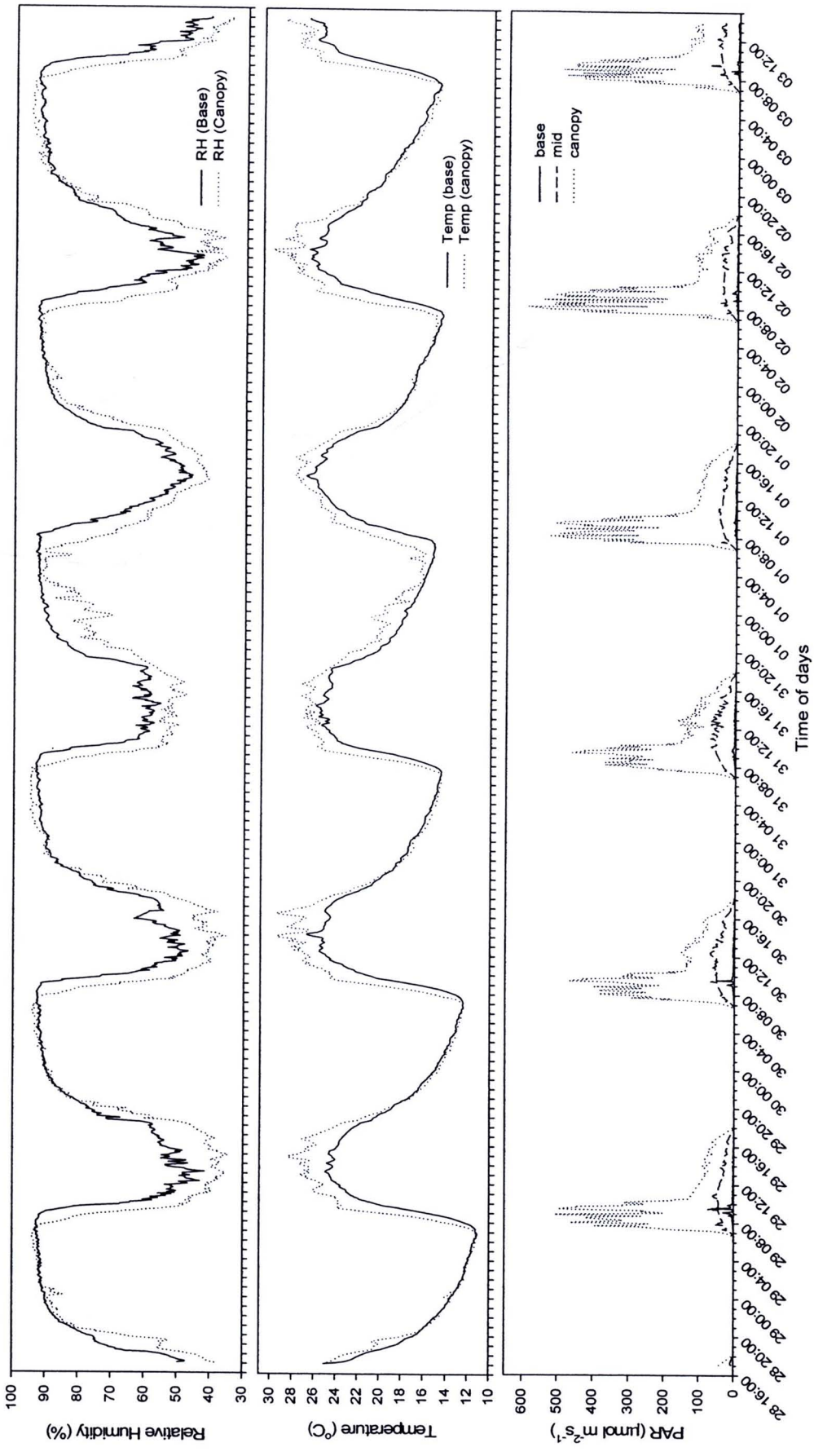

Figure 79 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 28 Jan to 3 Feb 2006.

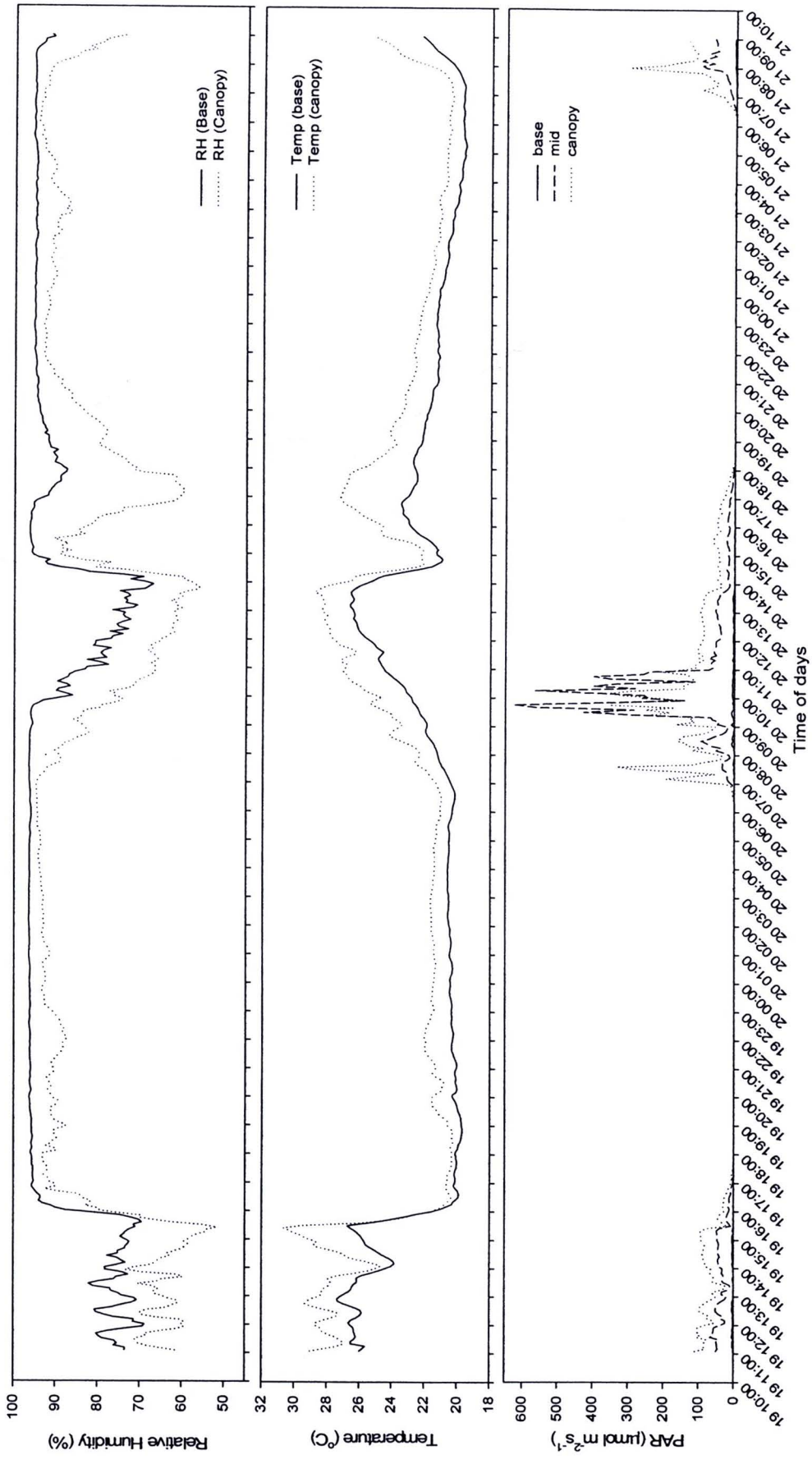

Figure 80 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 19 - 21 March 2006.

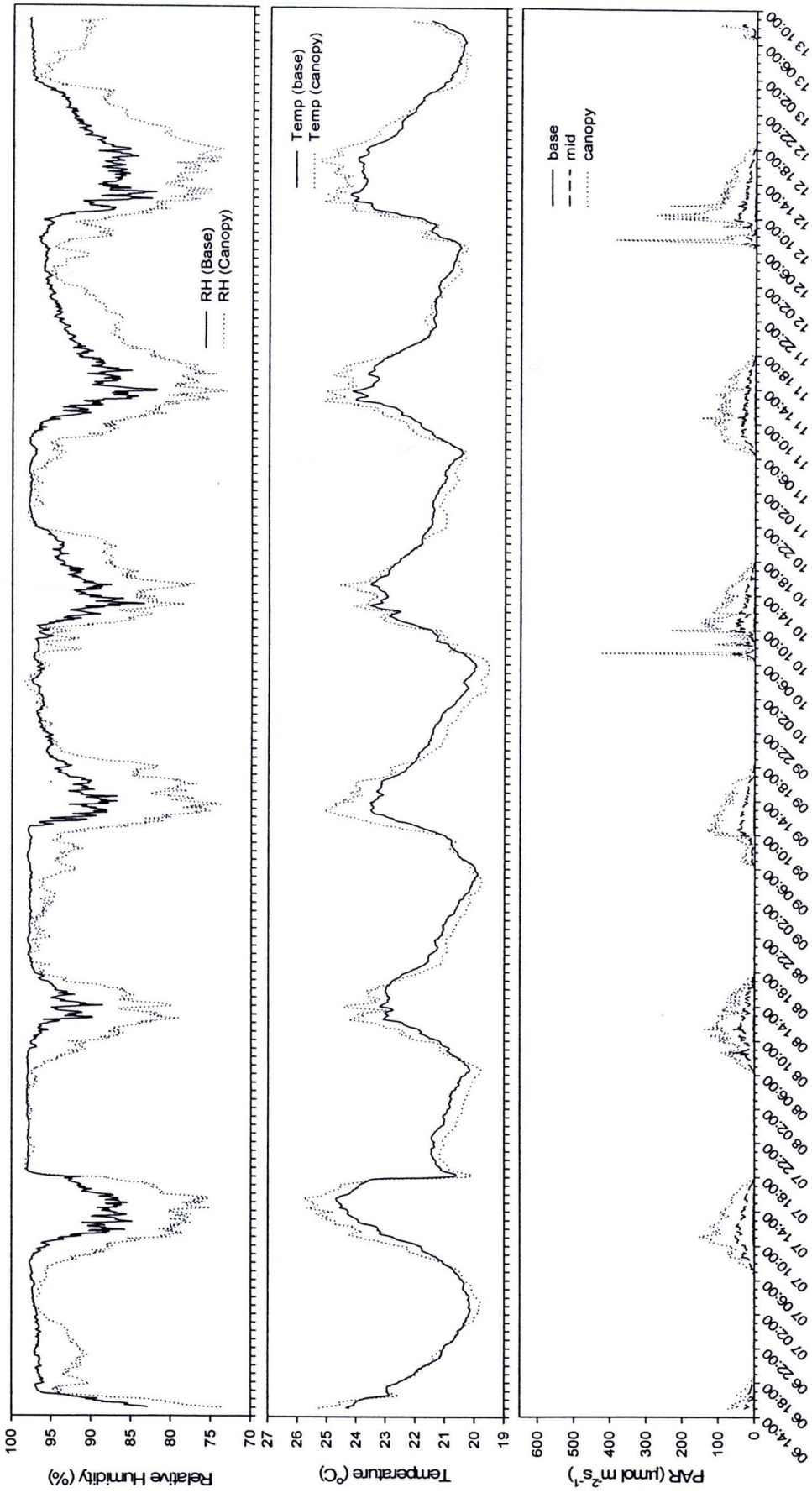

Figure 81 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 19 - 21 March 2006.

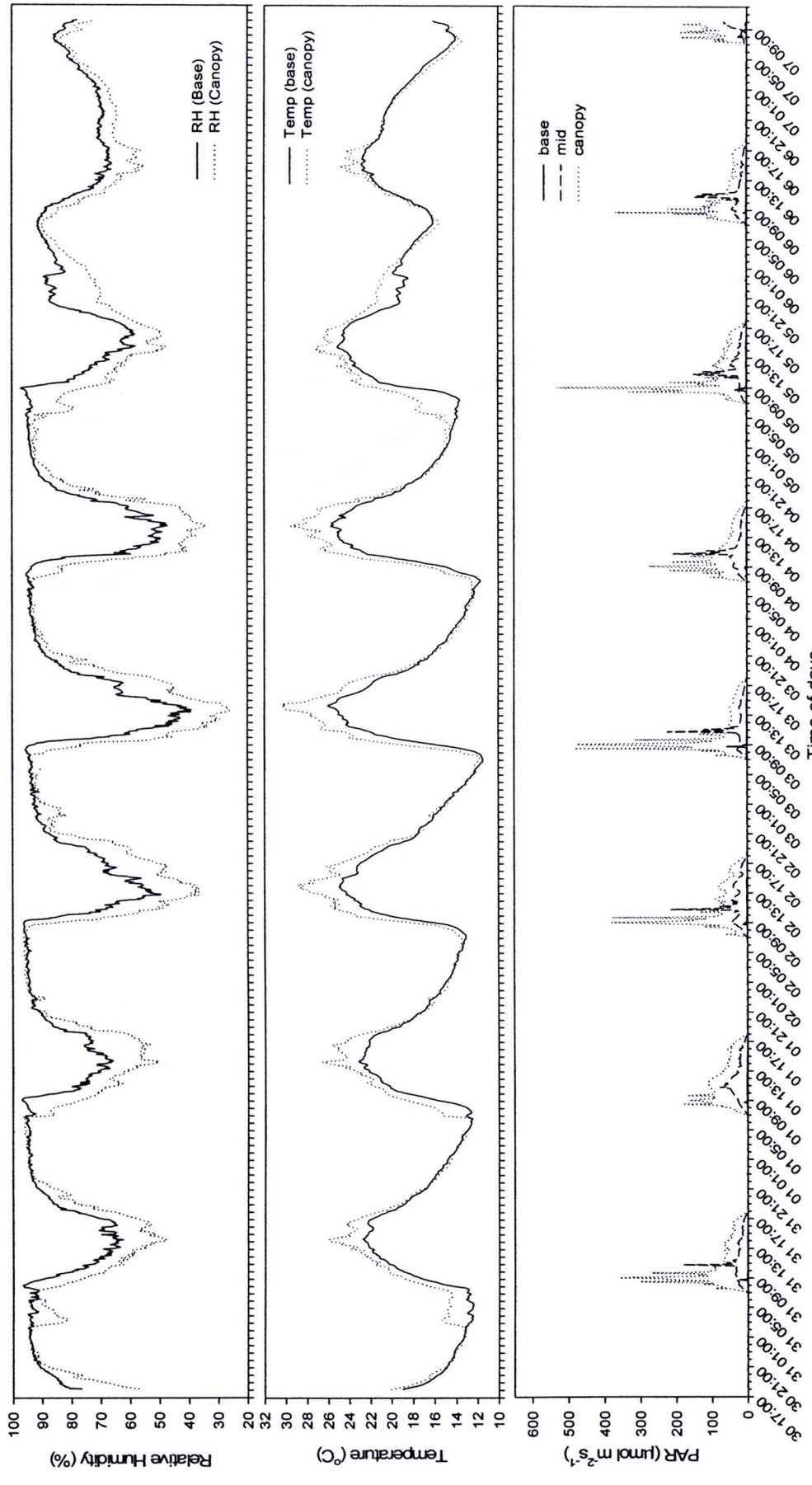

Figure 82 Microclimate of lichen habitat on *Terminalia citrina* in TRF recorded during 30 Dec 2006 to 7 Jan 2007.

Microclimate Data of Lower Montane Forest

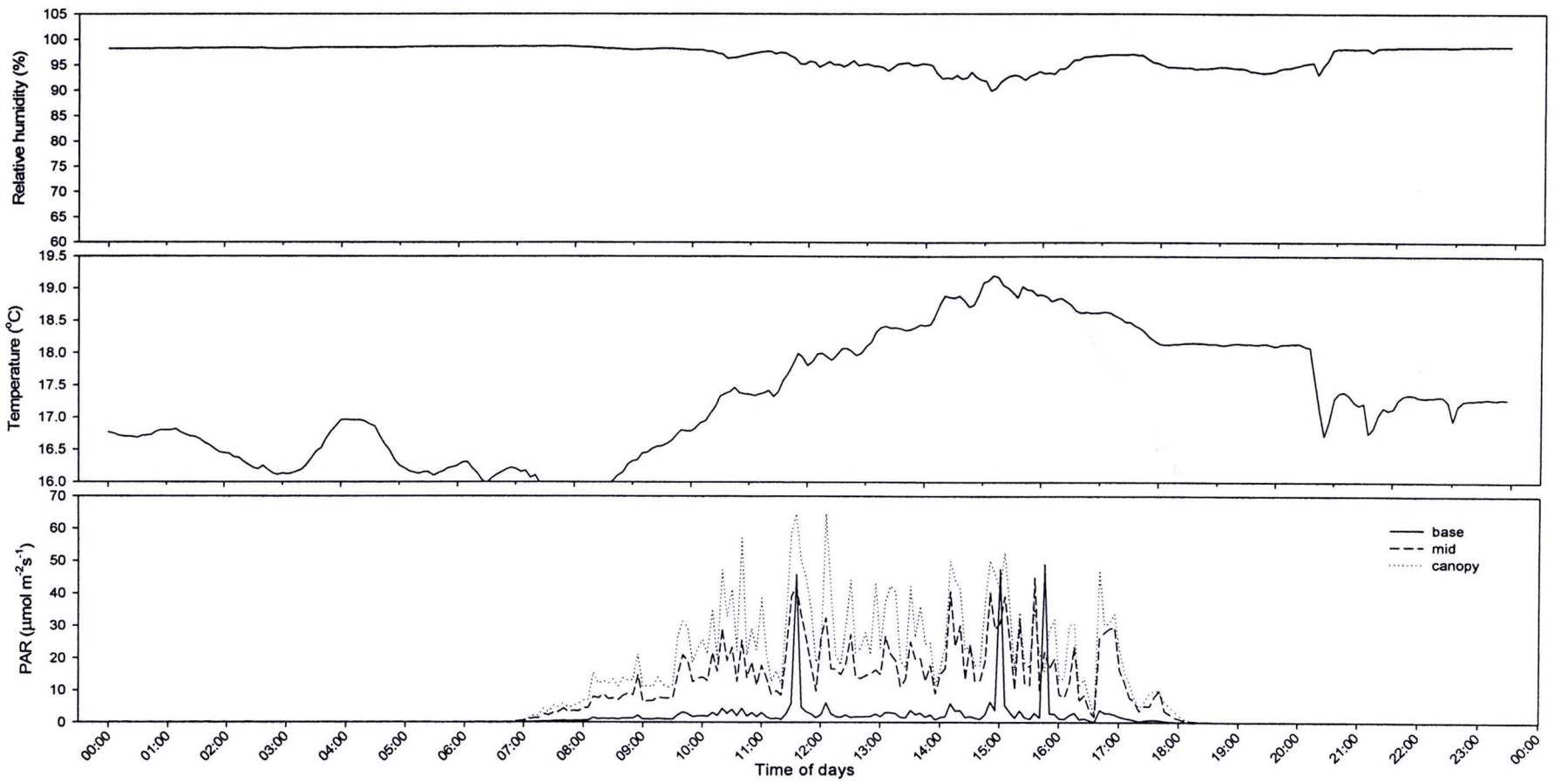

Figure 83 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded in 7 February 2004.

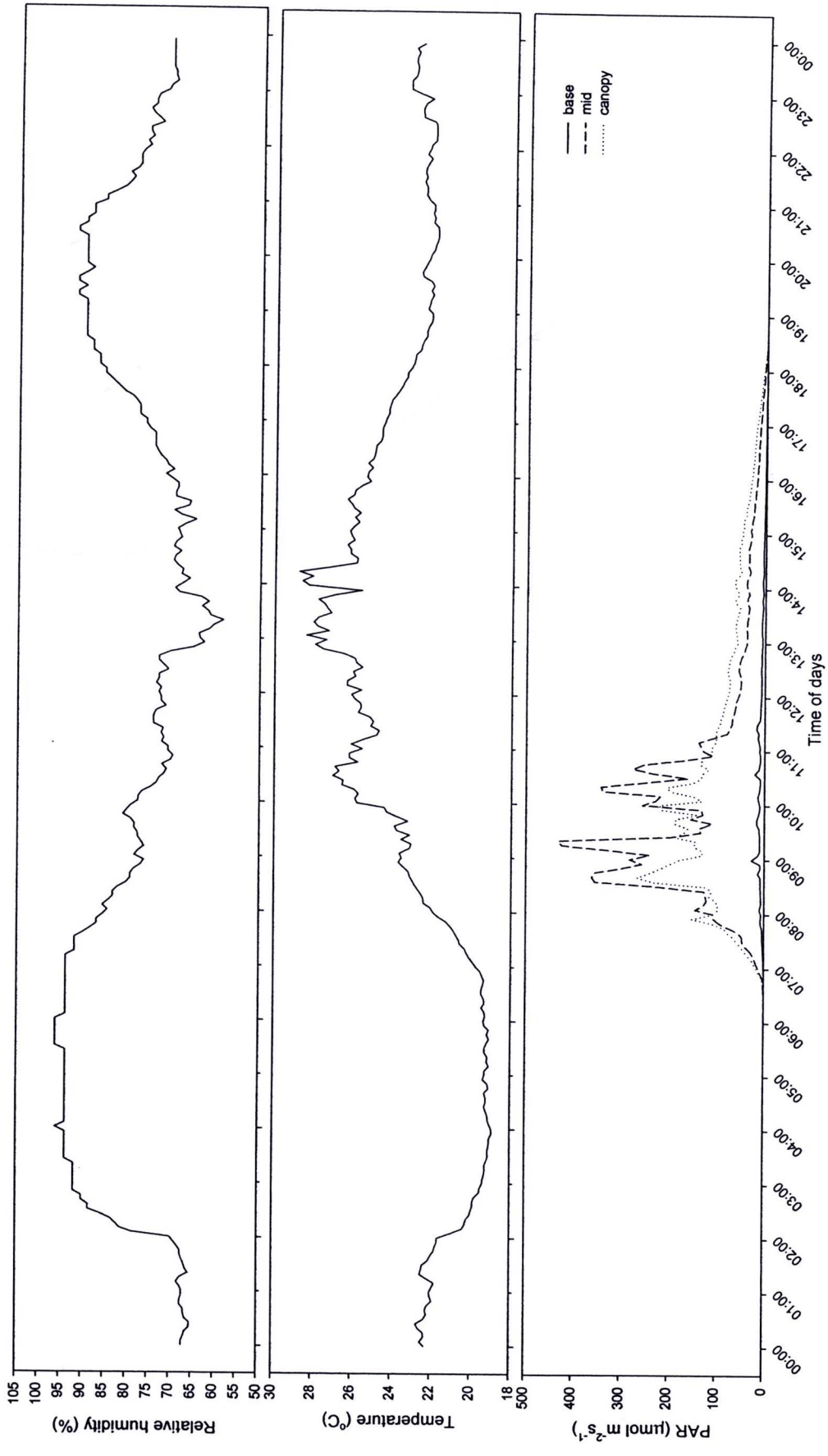

Figure 84 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded in 13 March 2004.

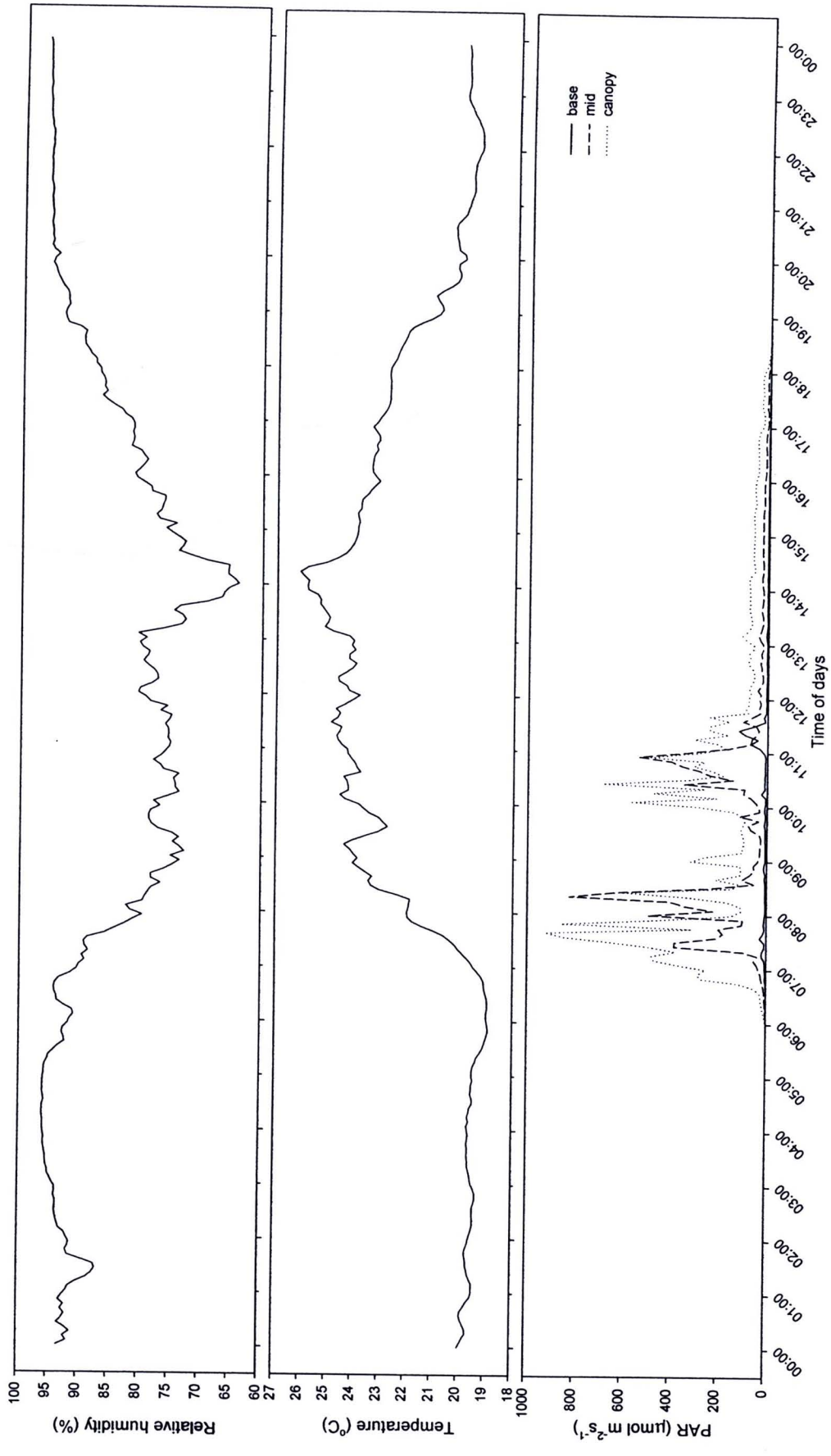

Figure 85 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded in 16 May 2004.

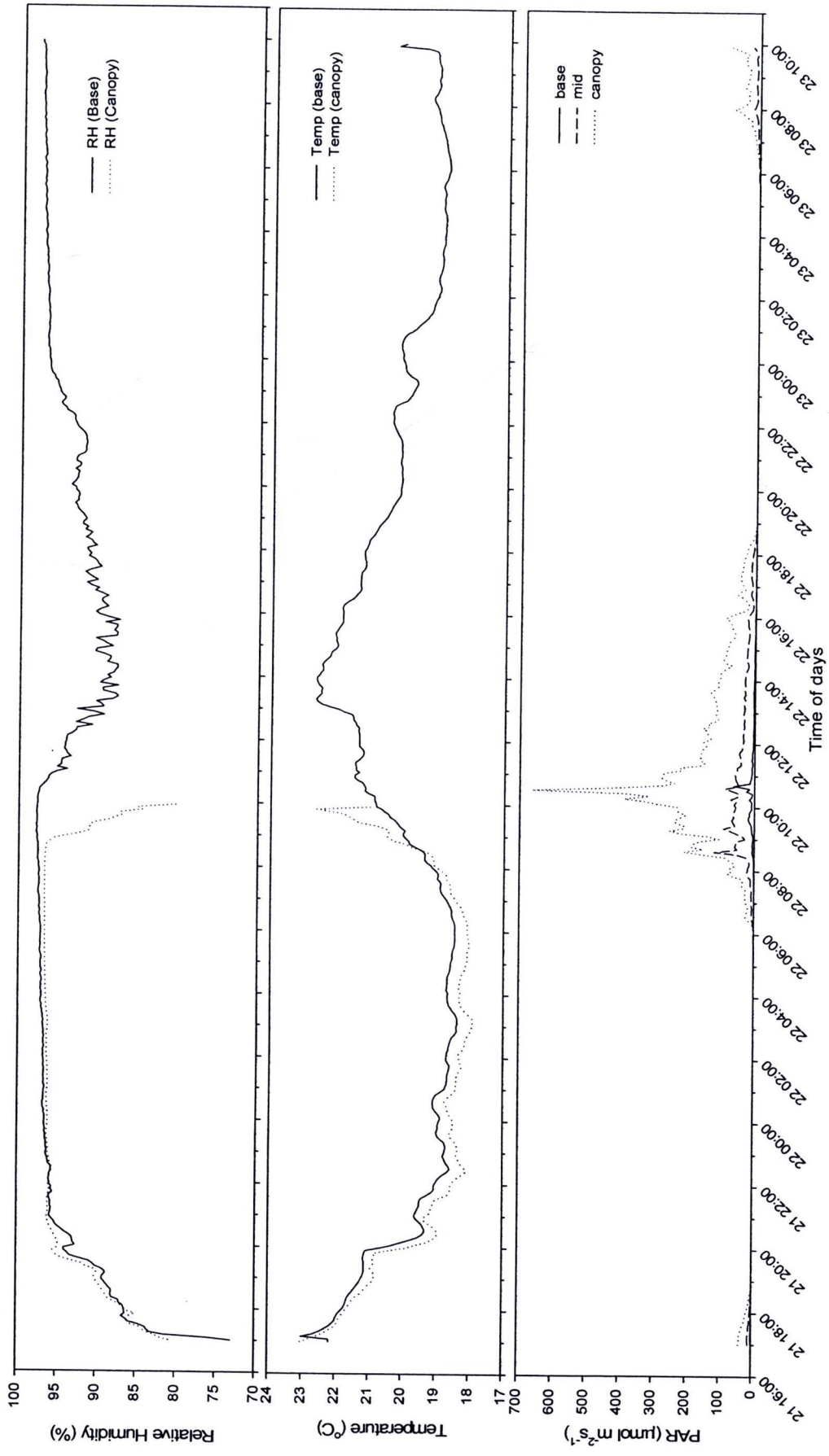

Figure 86 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 21-23 July 2004.

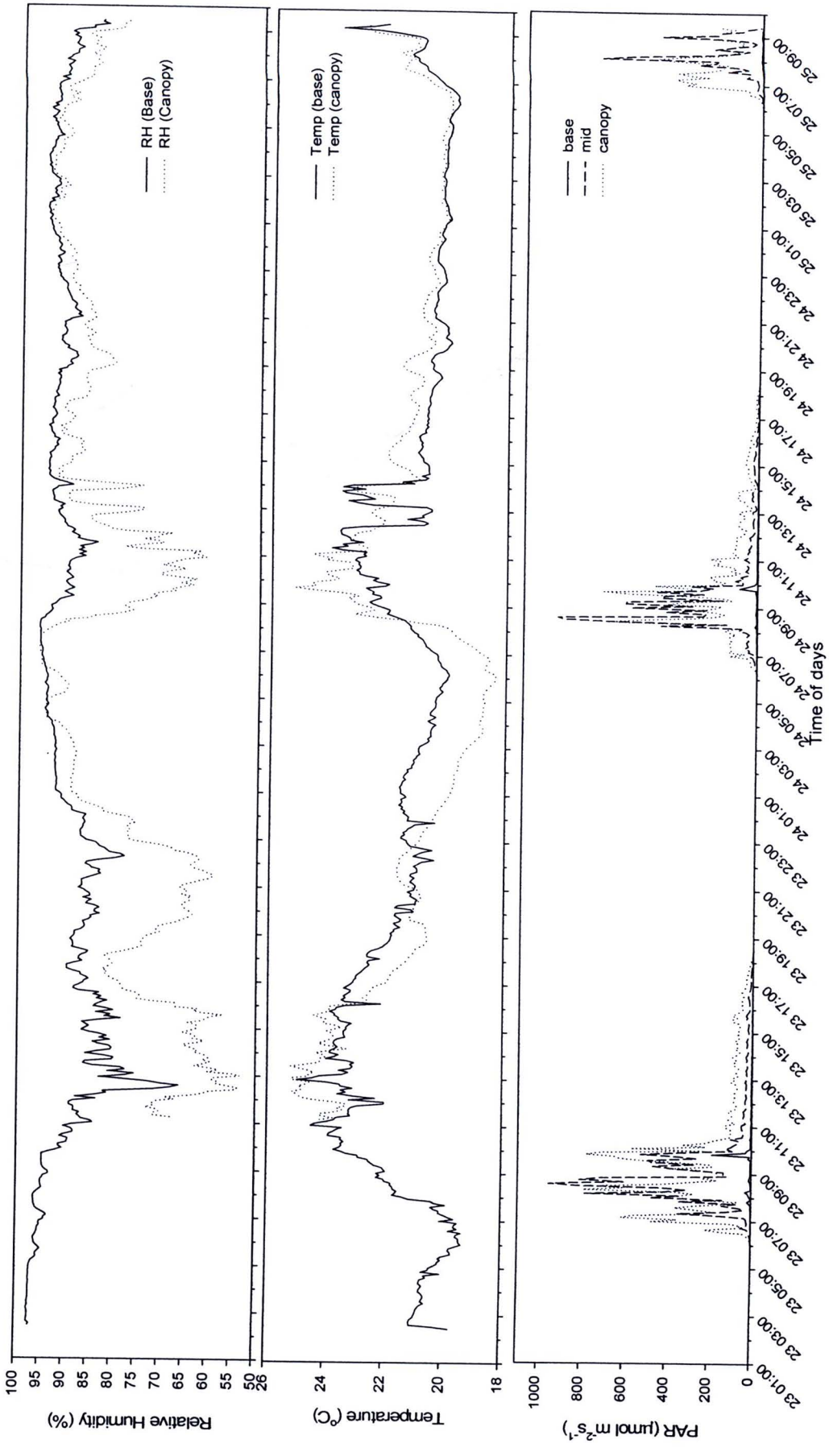

Figure 87 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 23-25 September 2004.

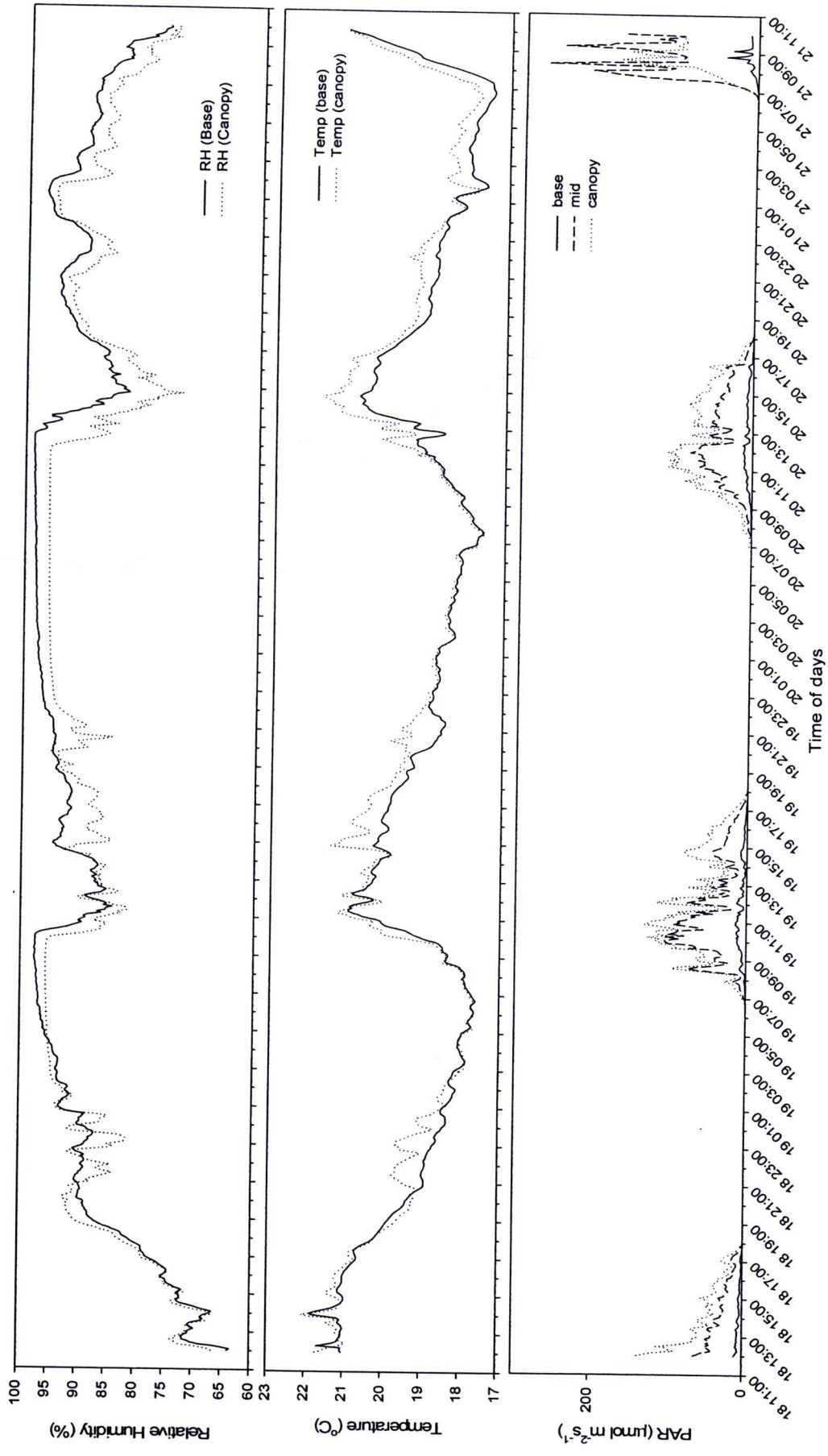

Figure 88 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 18-21 January 2005.

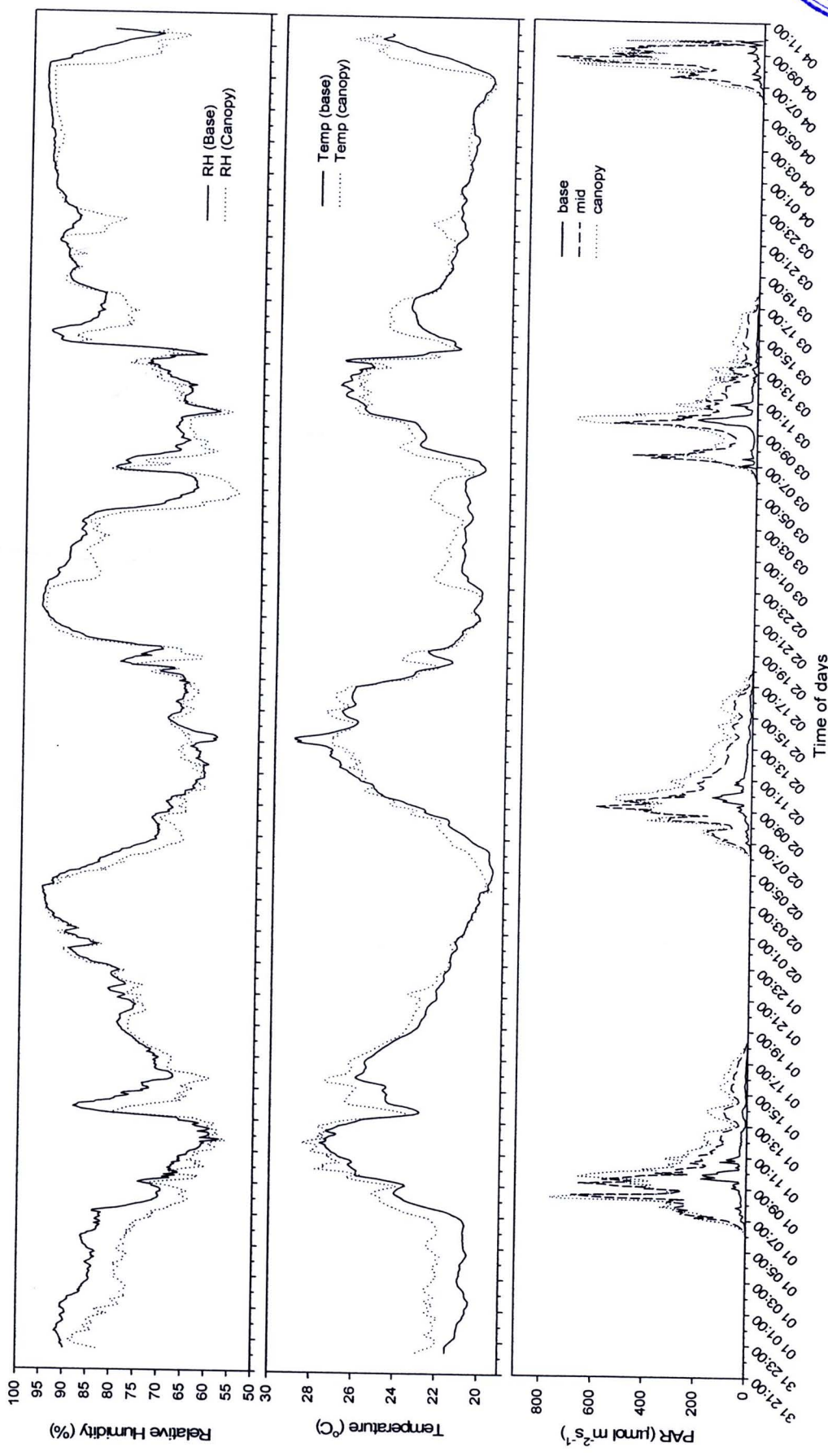

Figure 89 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 31 March -4 April 2005.

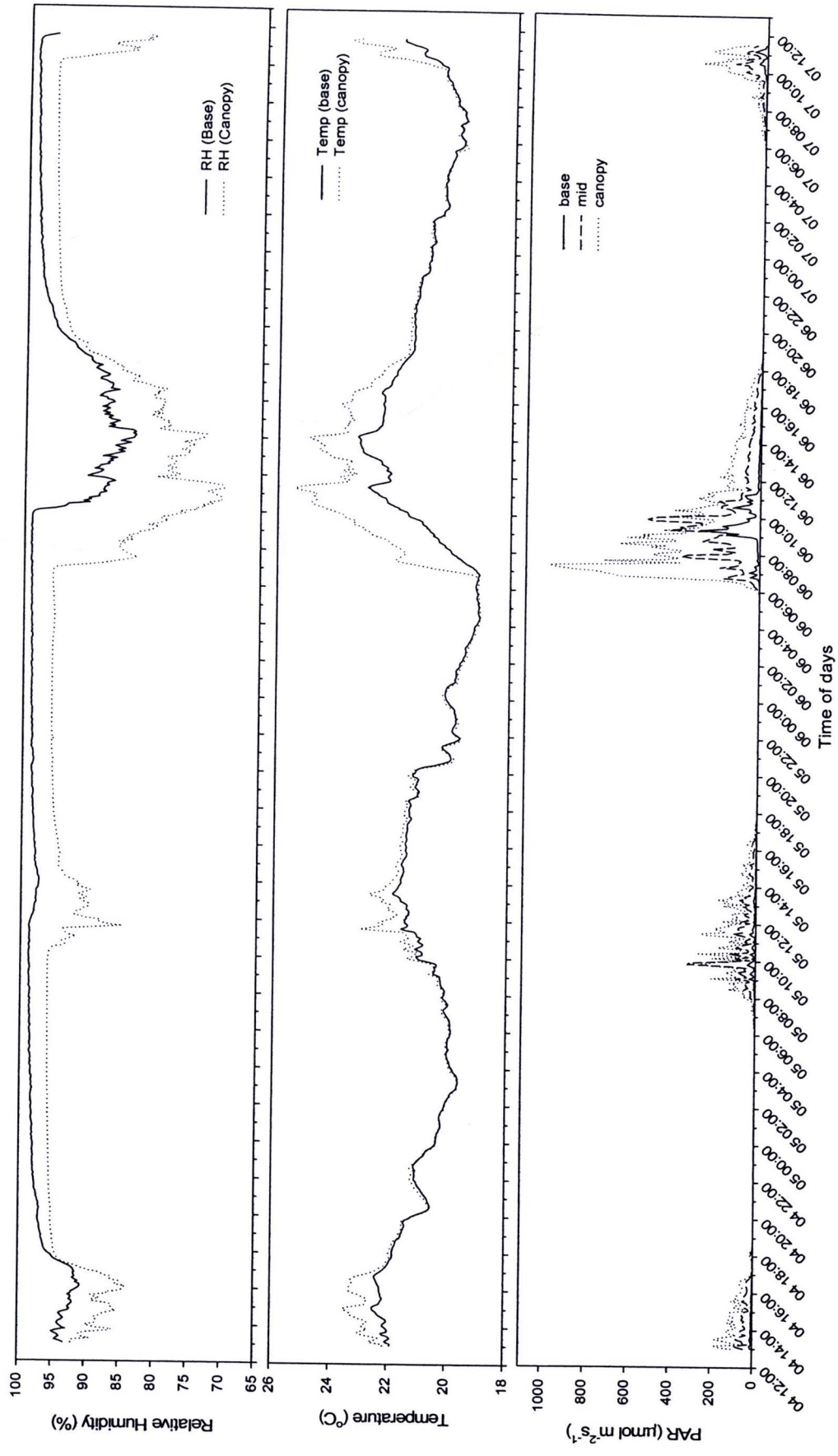

Figure 90 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 4-7 June 2005.

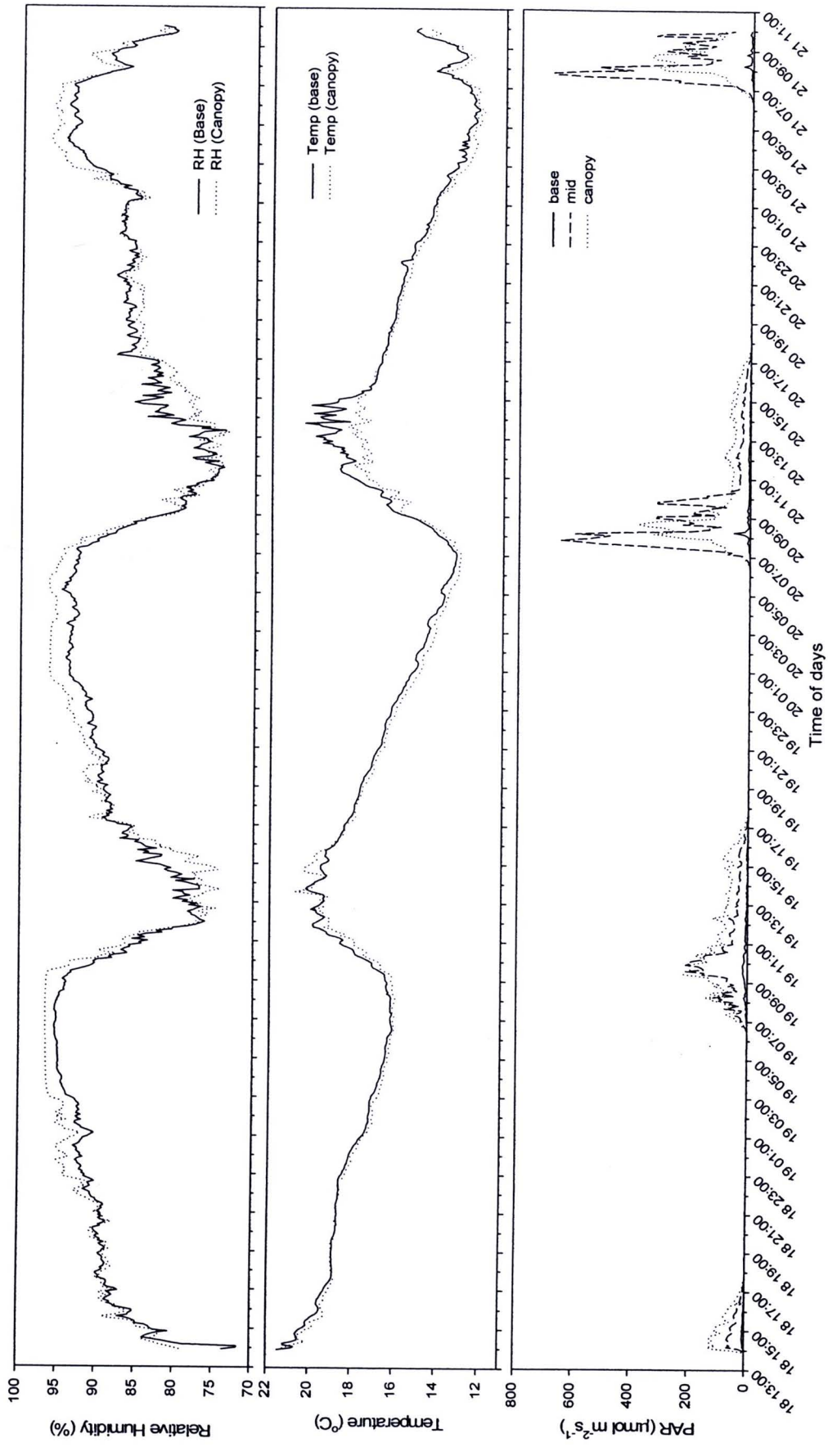

Figure 91 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 18-21 November 2005.

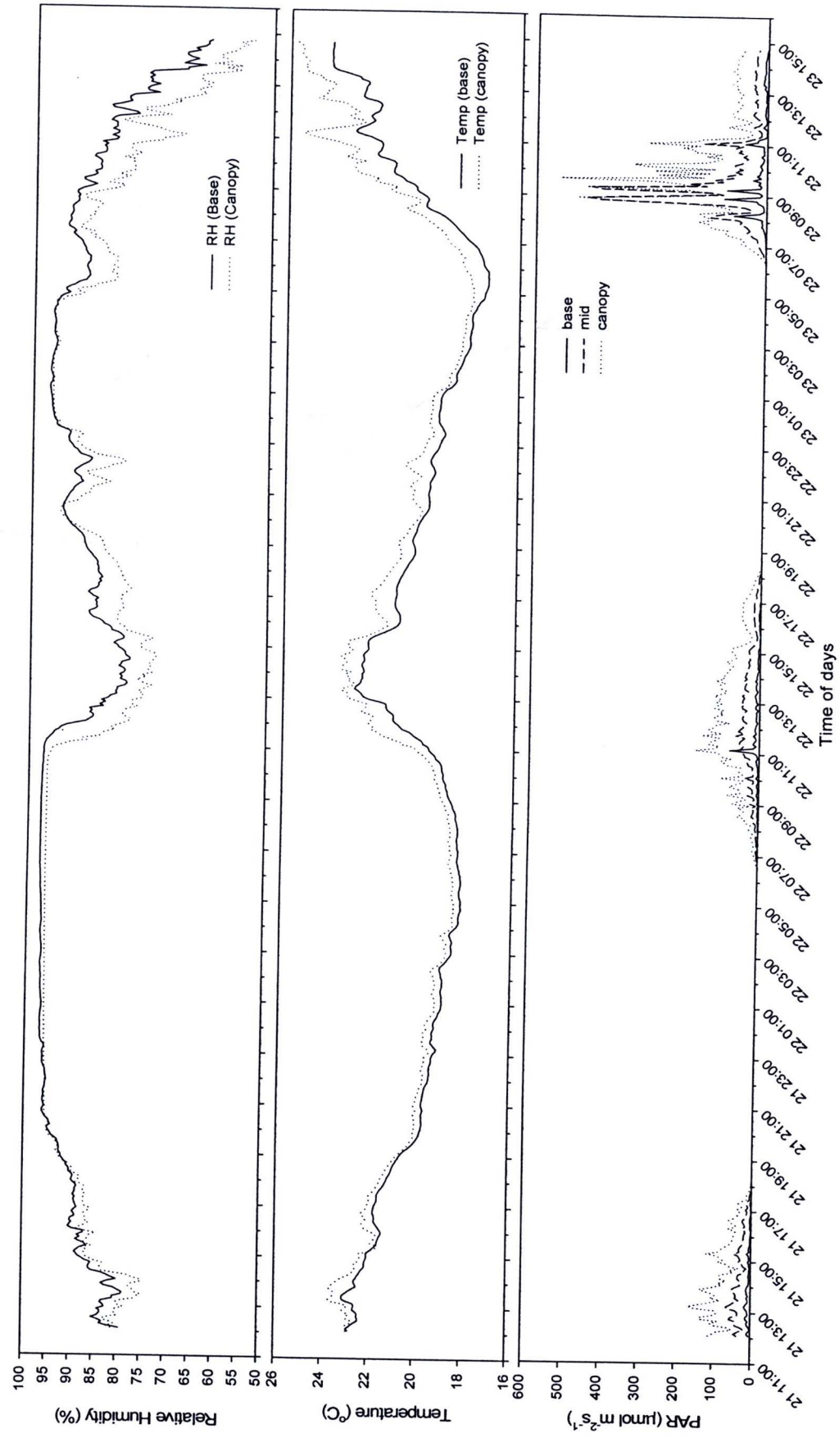

Figure 92 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 21-23 March 2006.

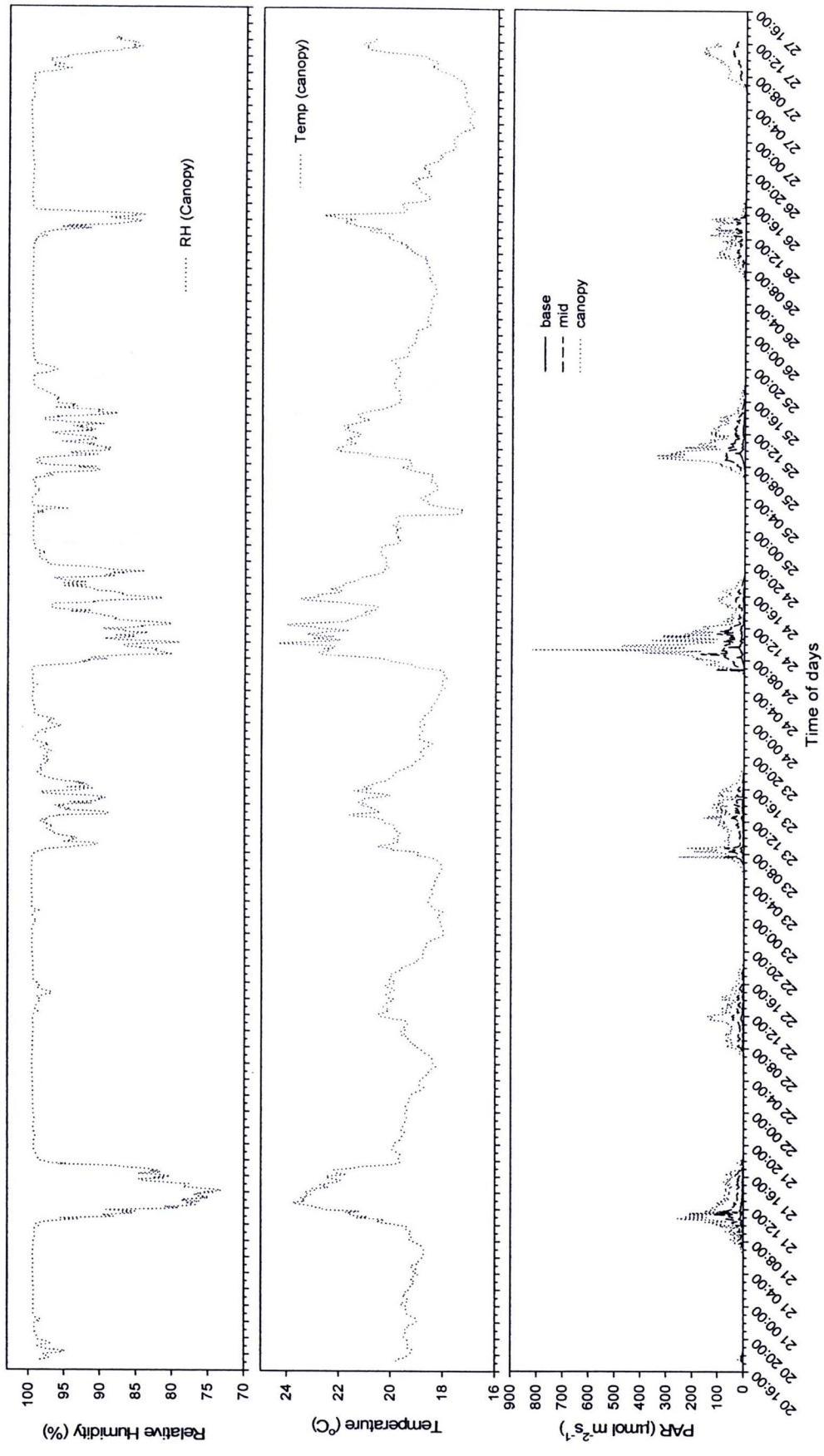

Figure 93 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 20-27 September 2006.

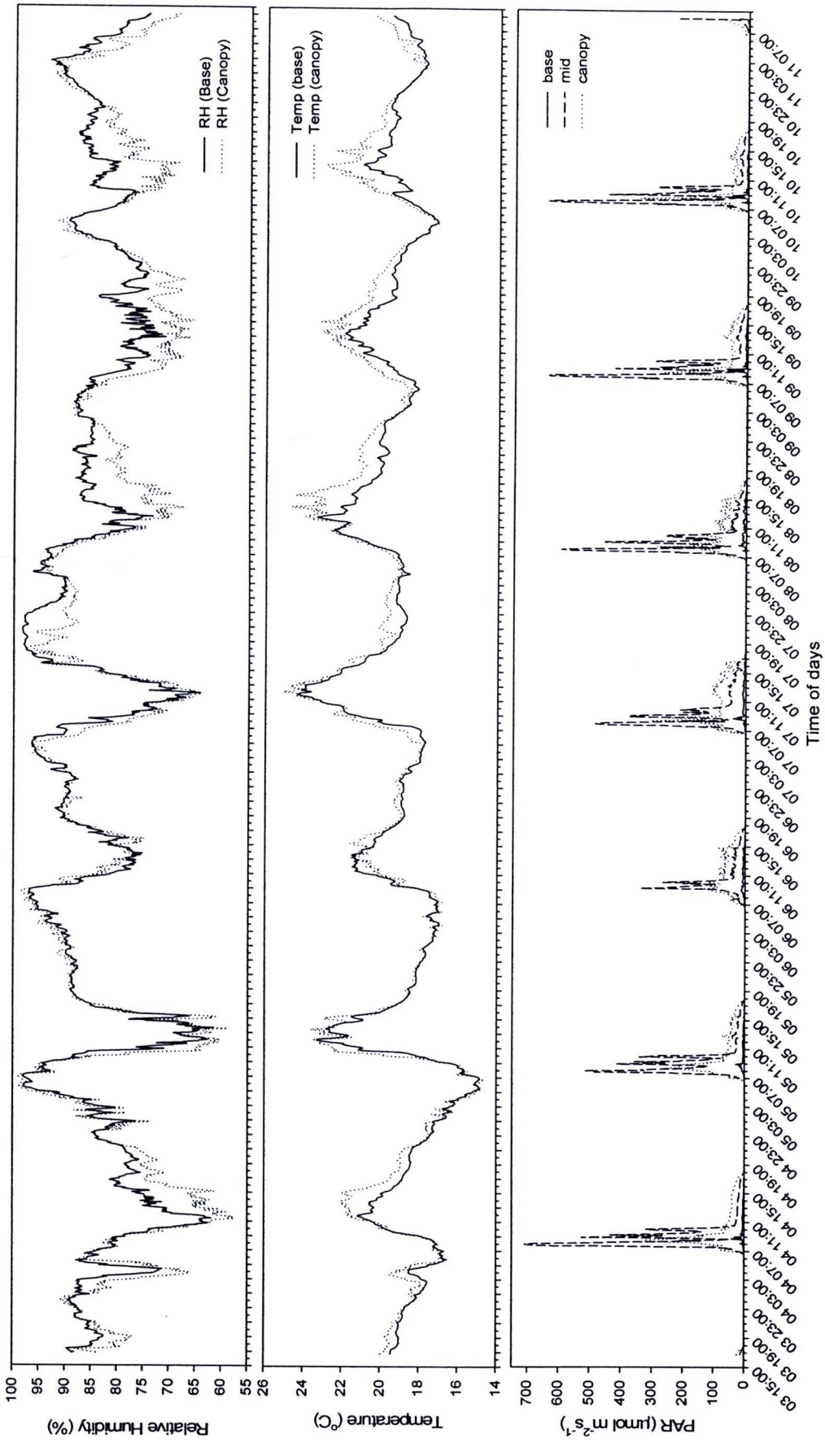

Figure 94 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 3-11 December 2006.

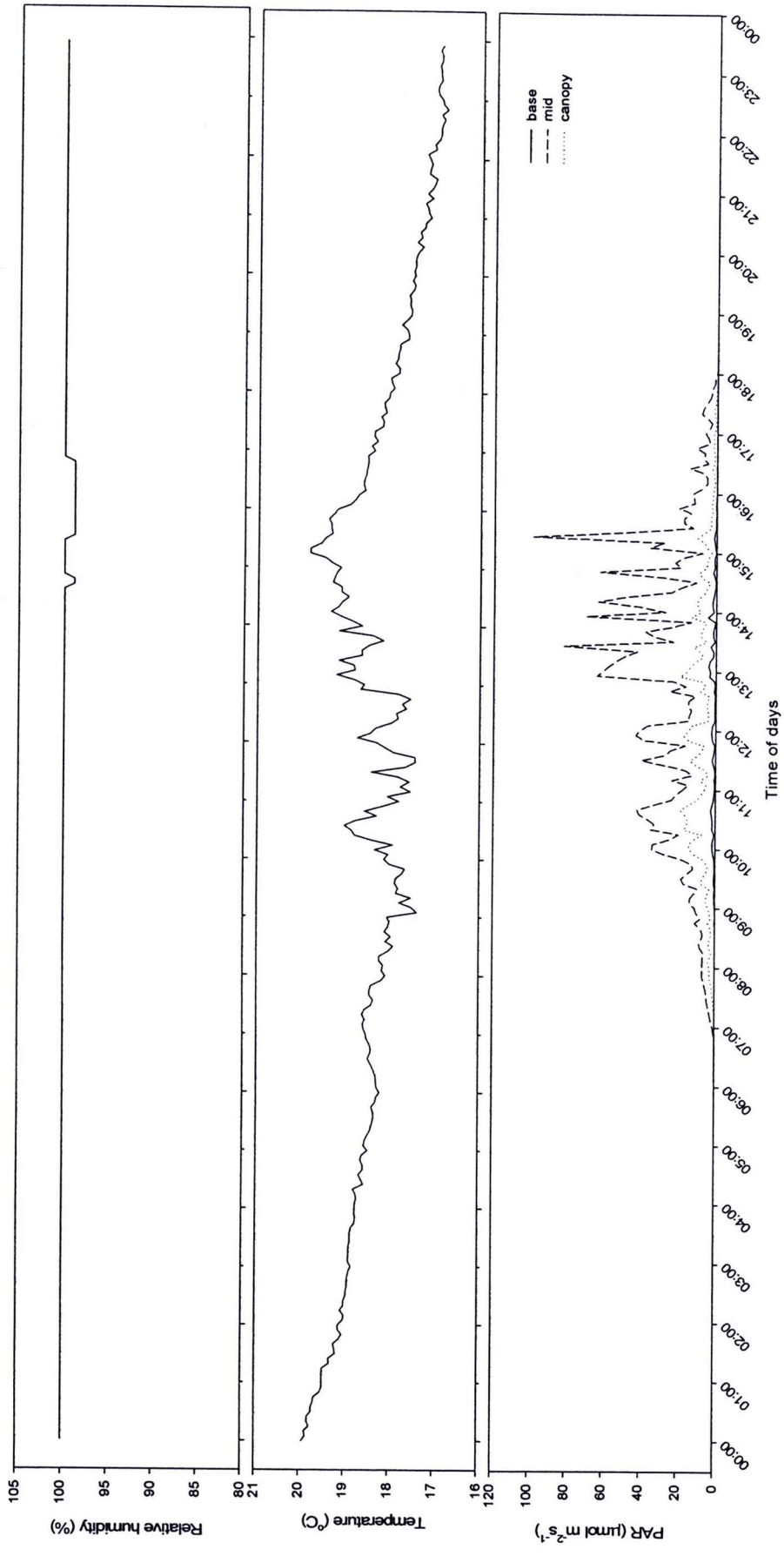

Figure 95 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 6 February 2004.

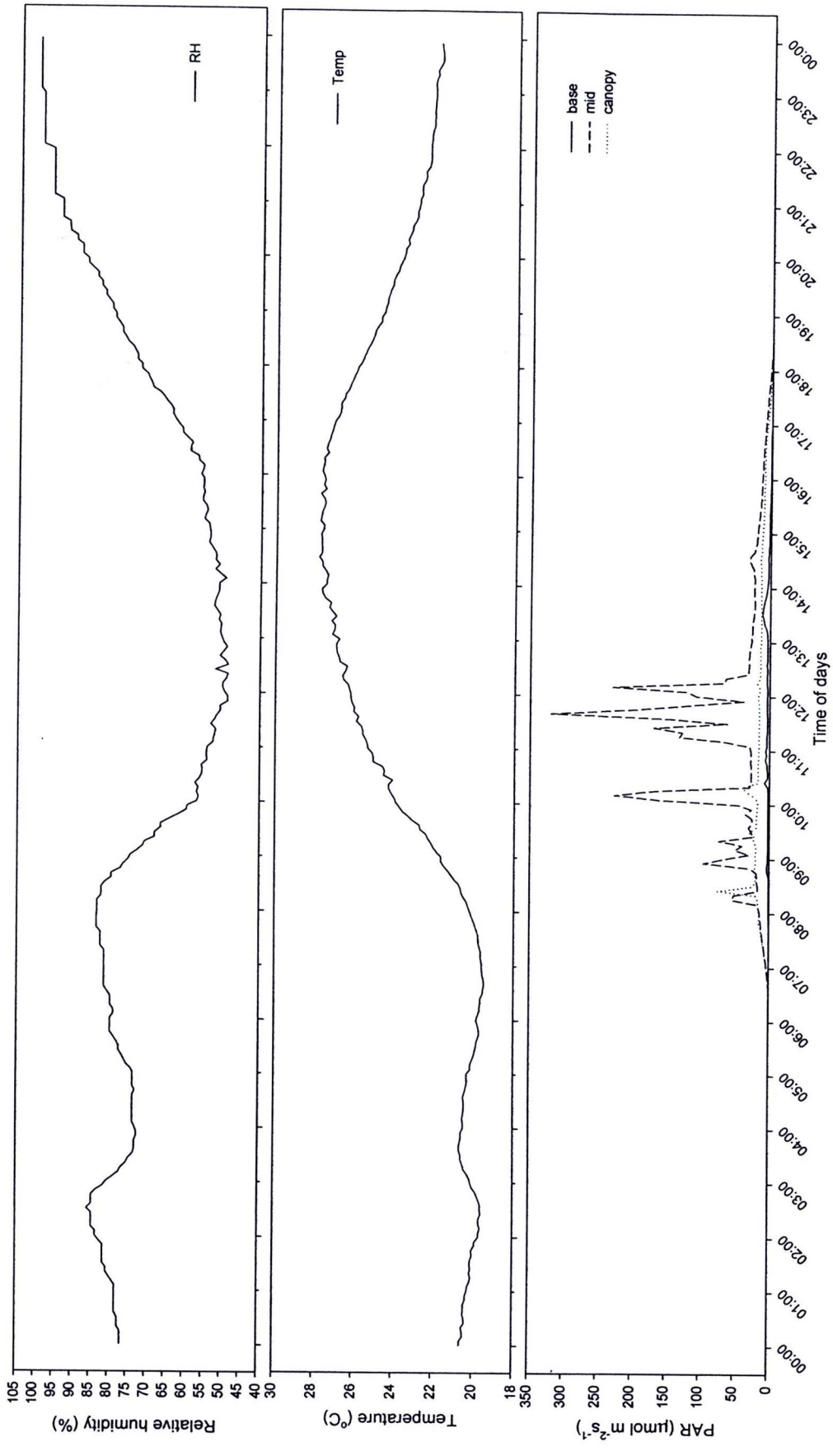

Figure 96 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 11 March 2004.

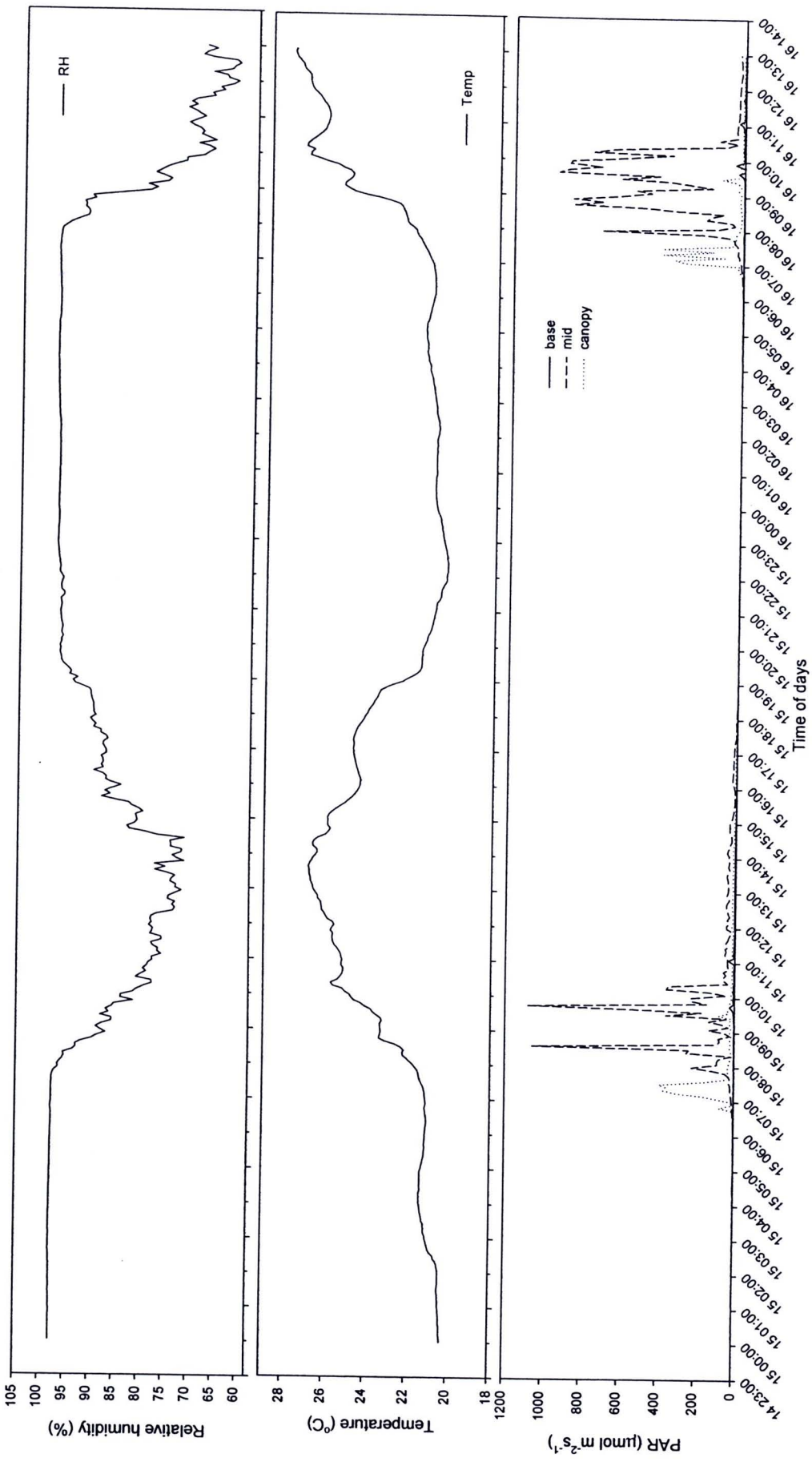

Figure 97 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 15-16 May 2004.

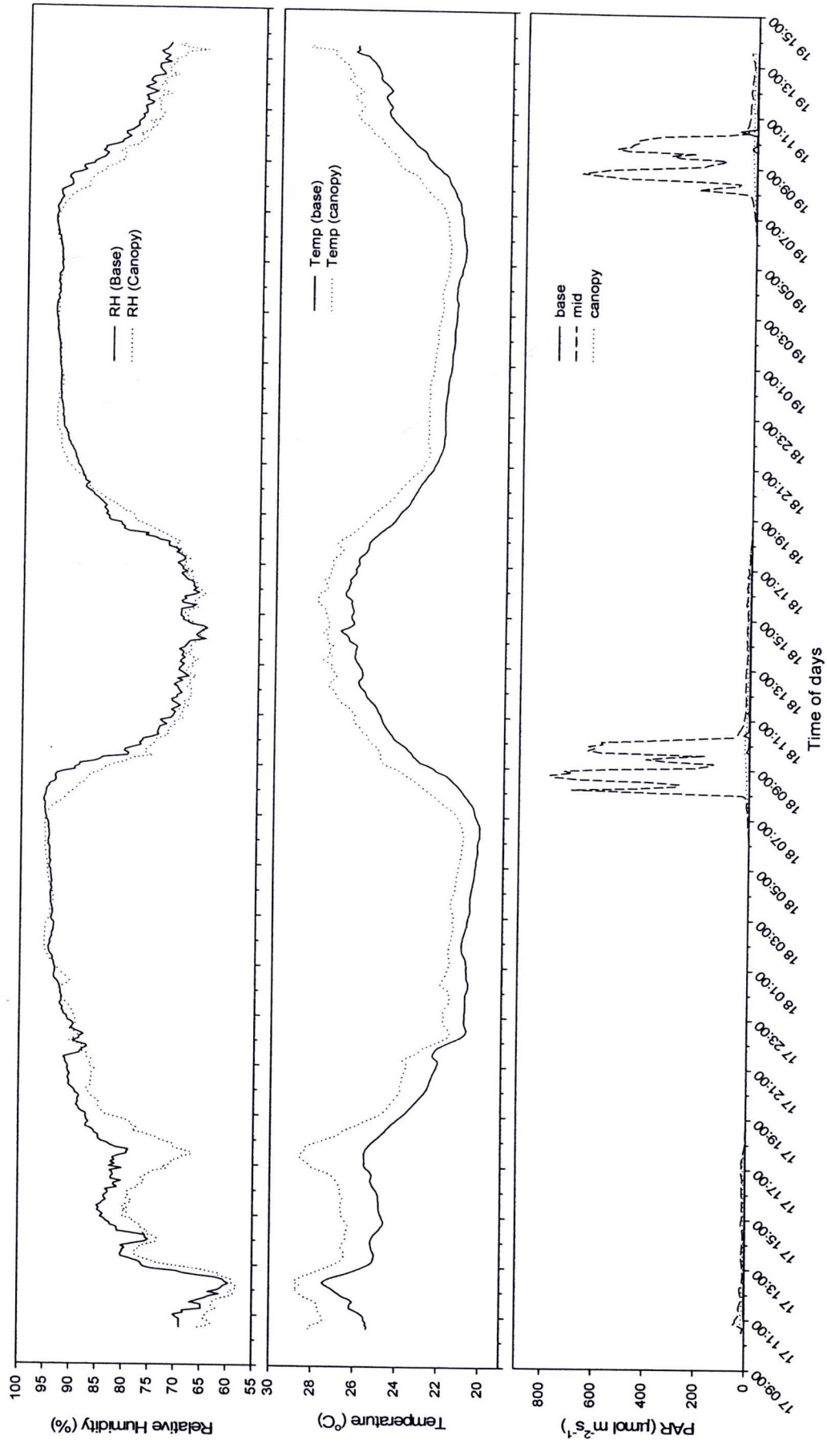

Figure 98 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 17-19 July 2004.

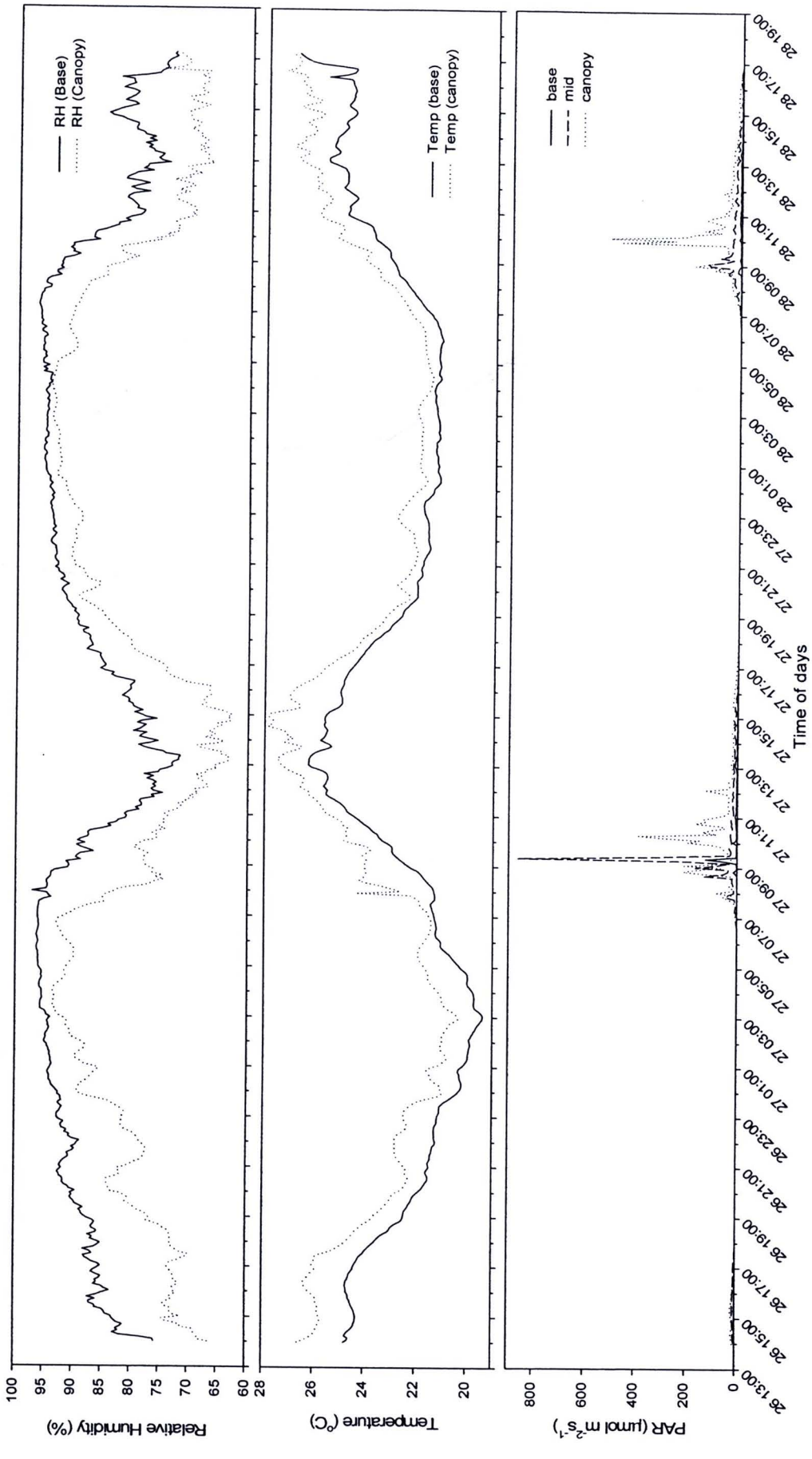

Figure 99 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 26-28 September 2004.

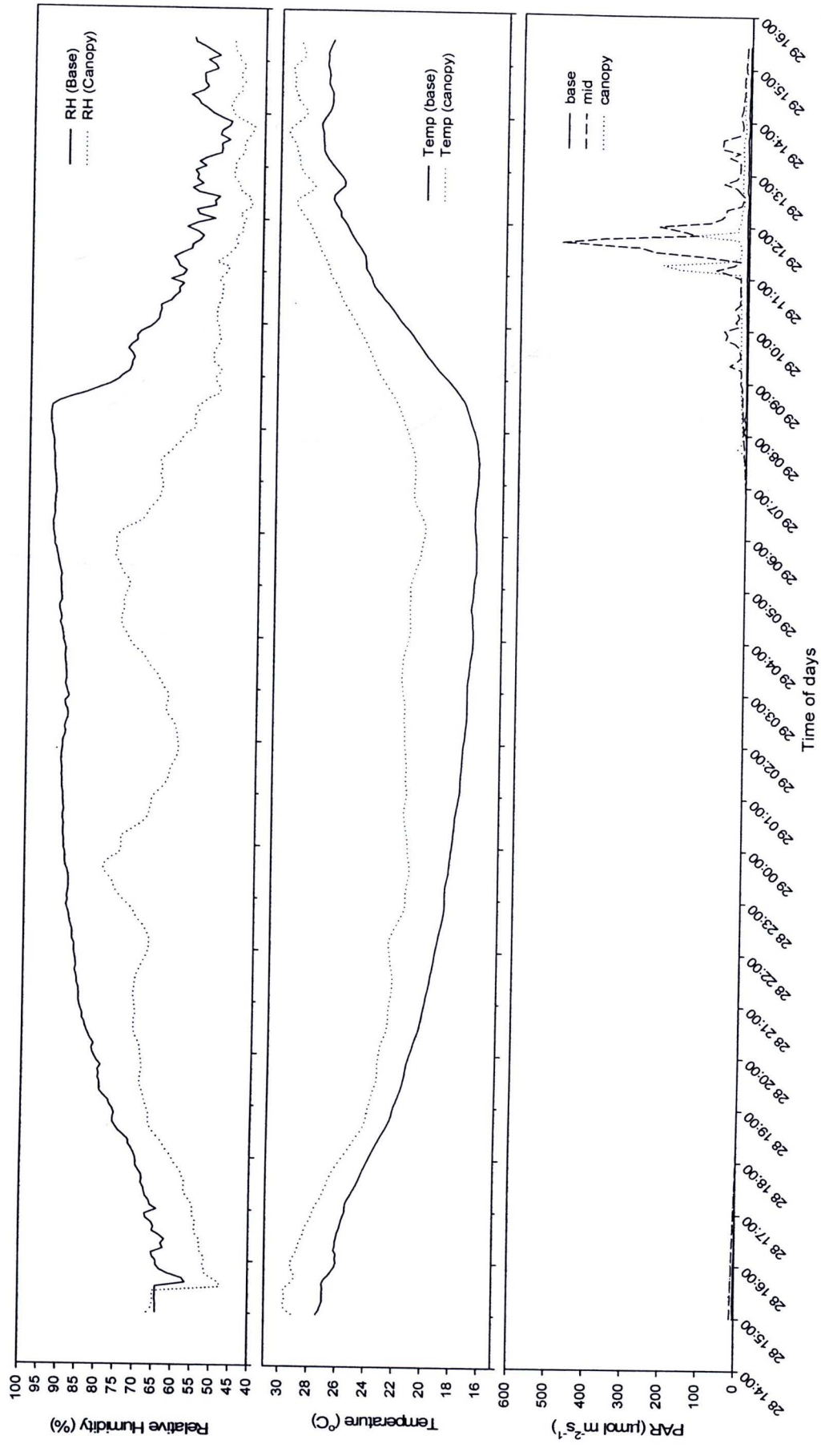

Figure 100 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 28-29 January 2005.

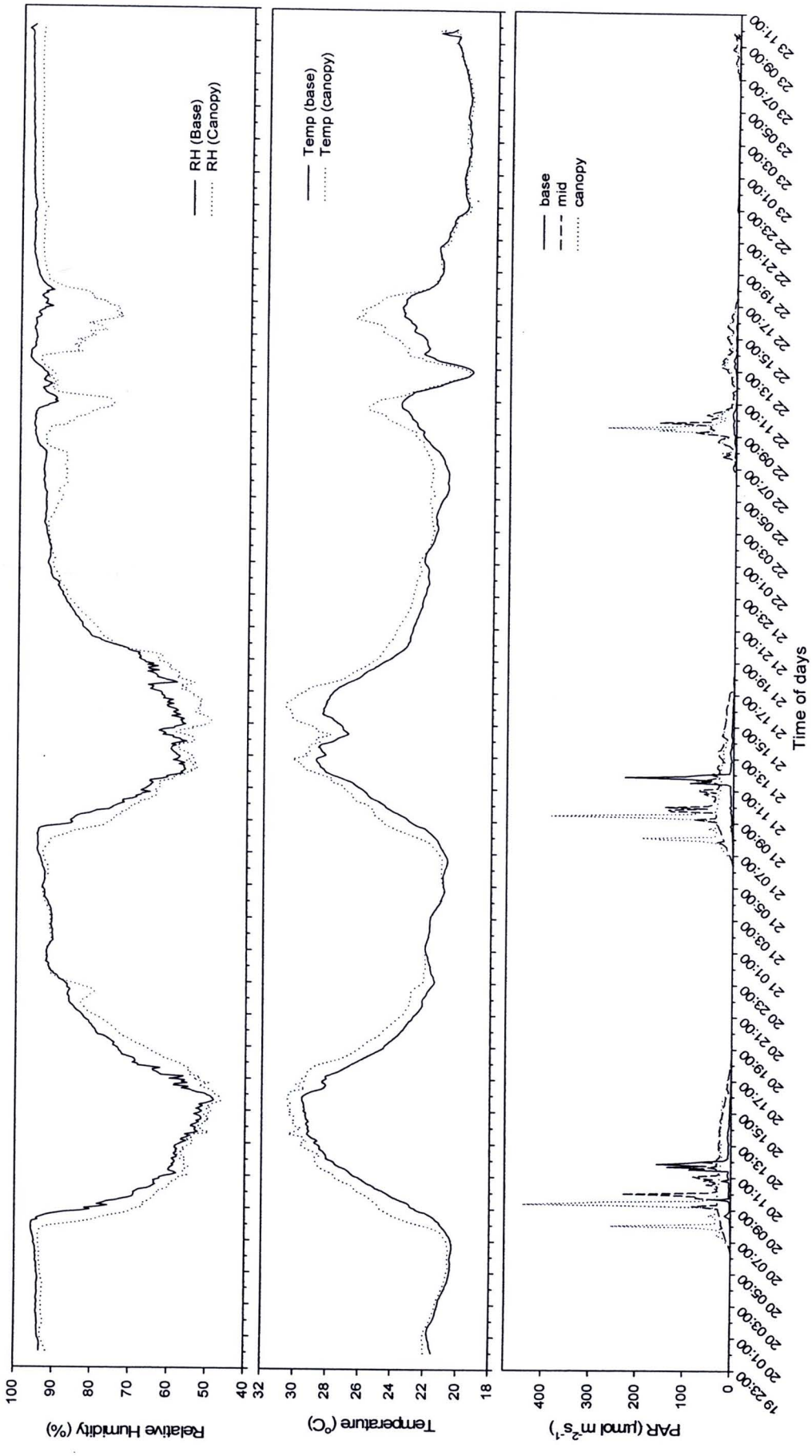

Figure 101 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 20-23 March 2005.

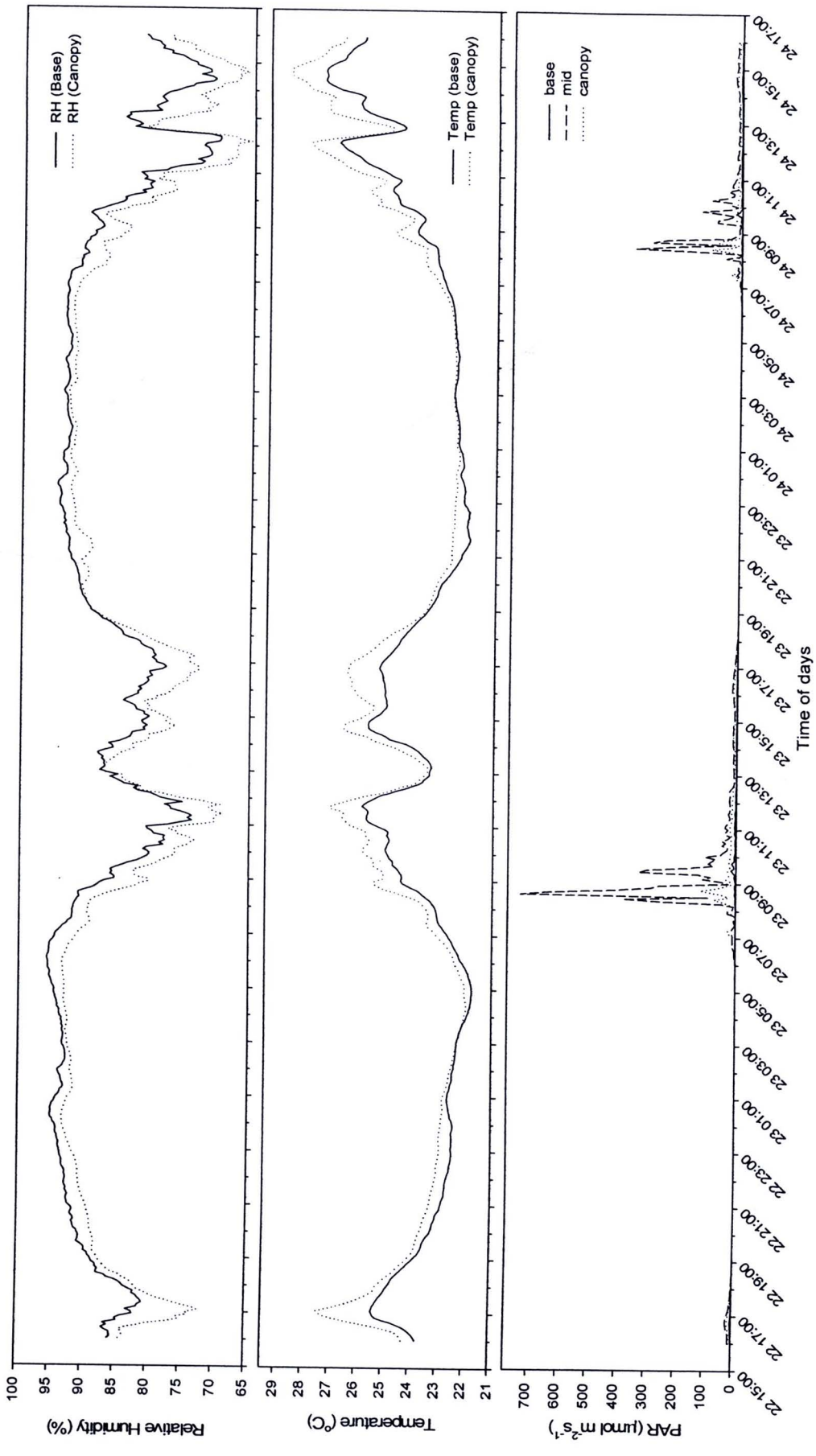

Figure 102 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 22-24 May 2005.

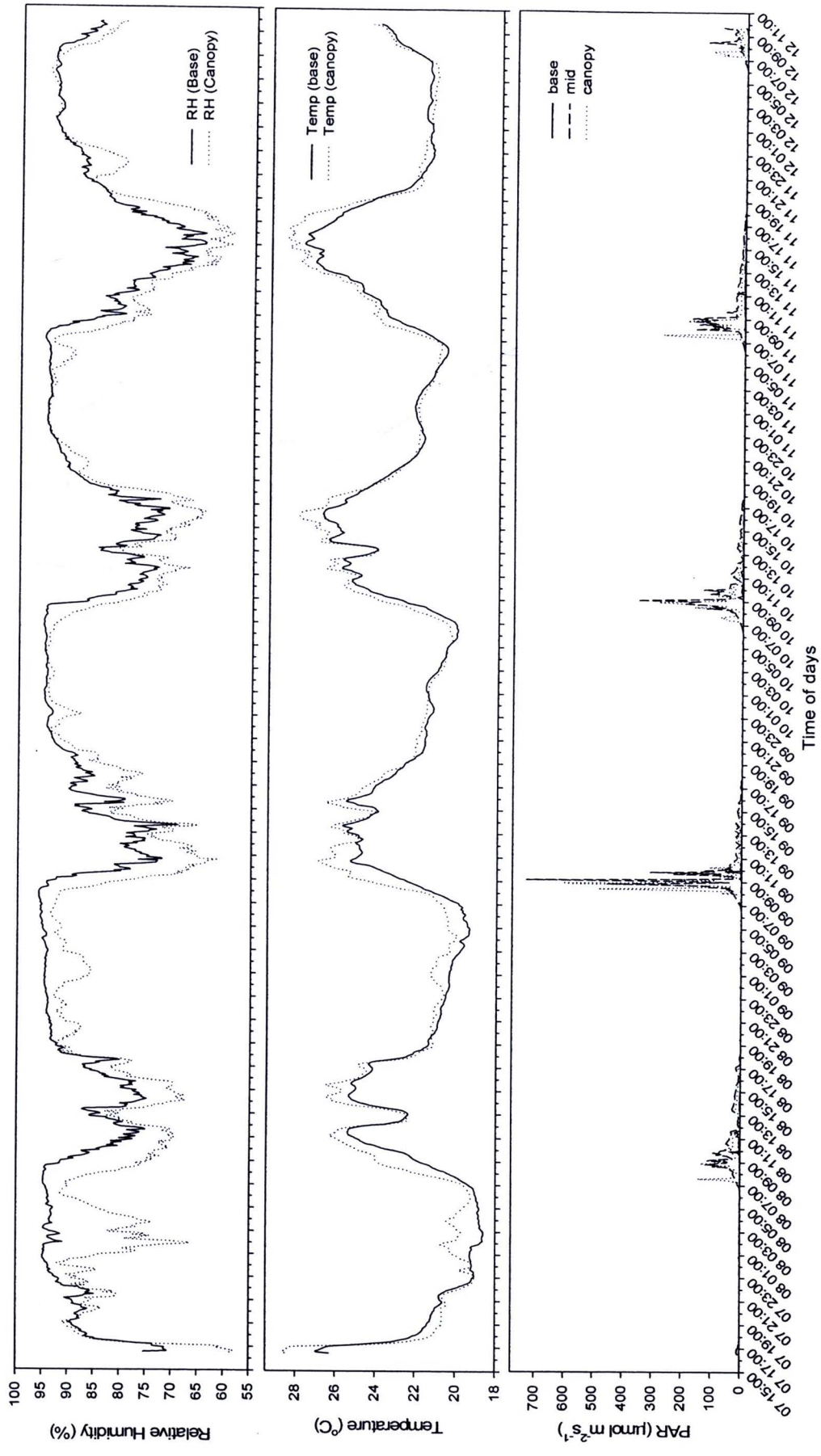

Figure 103 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 7-12 April 2006.

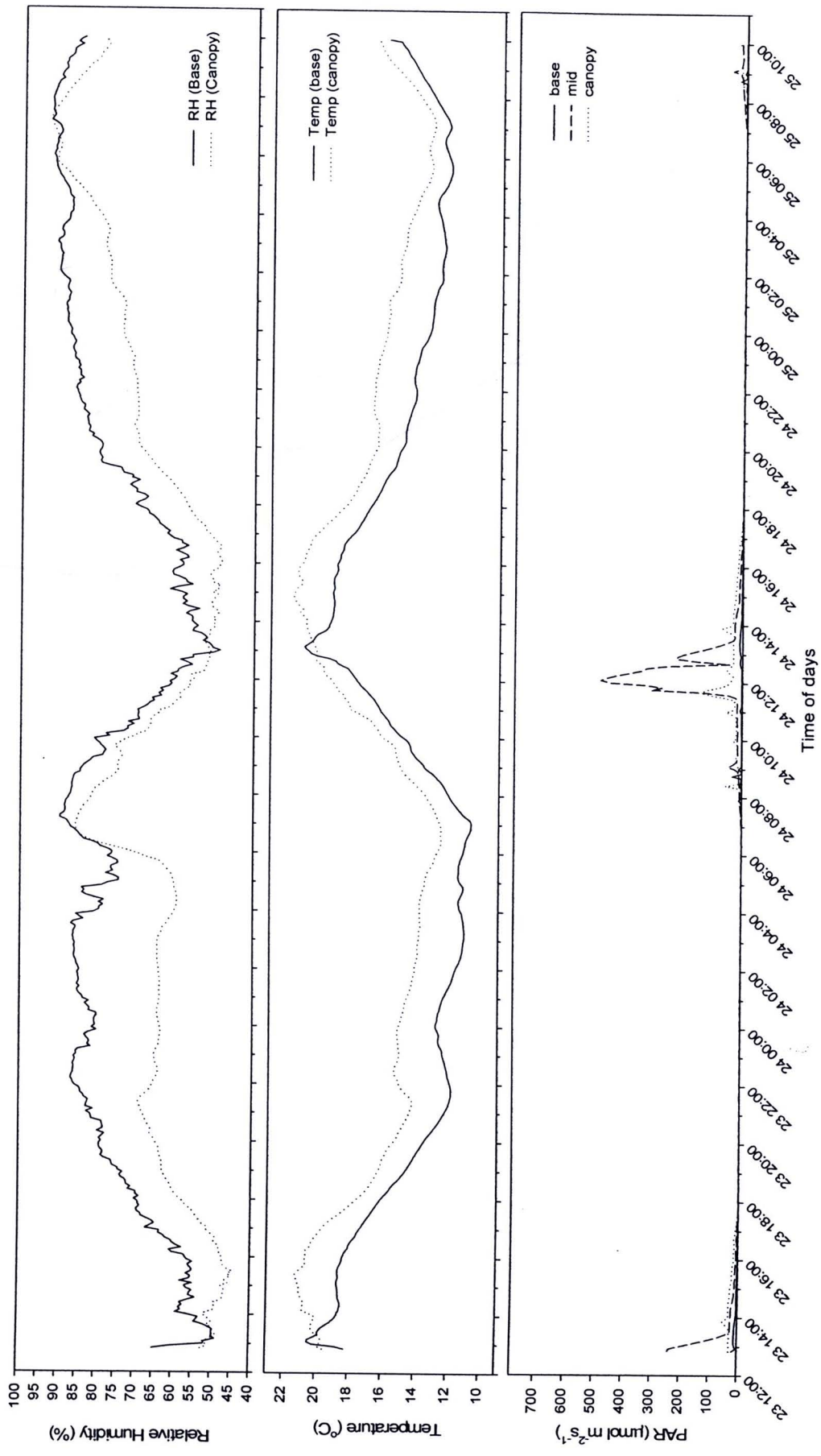

Figure 104 Microclimate of lichen habitat on *Terminalia* sp. in DEF recorded during 23-25 December 2006

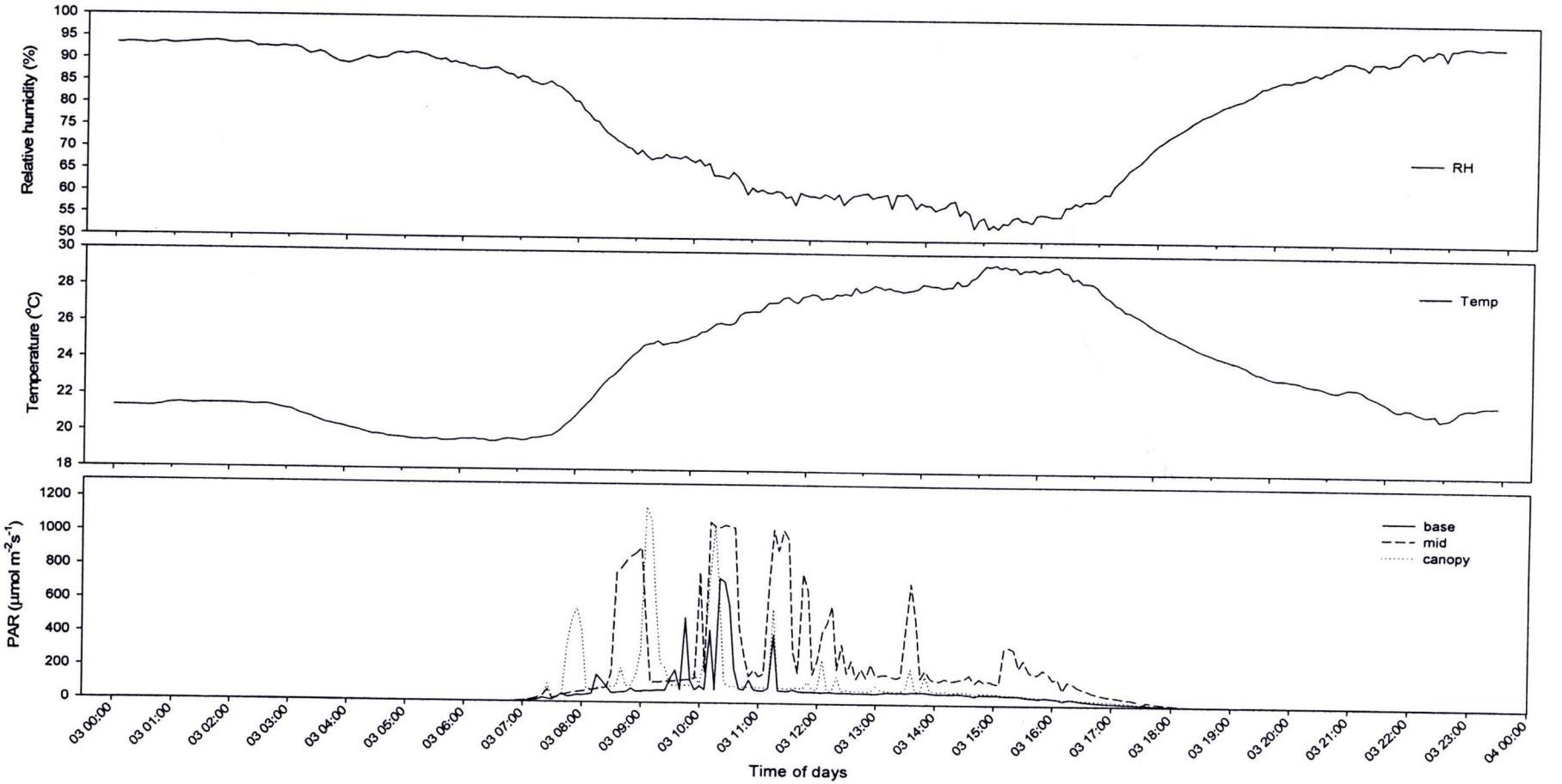

Figure 105 Microclimate of lichen habitat on *Schima wallichii* in SF recorded in 3 February 2004.

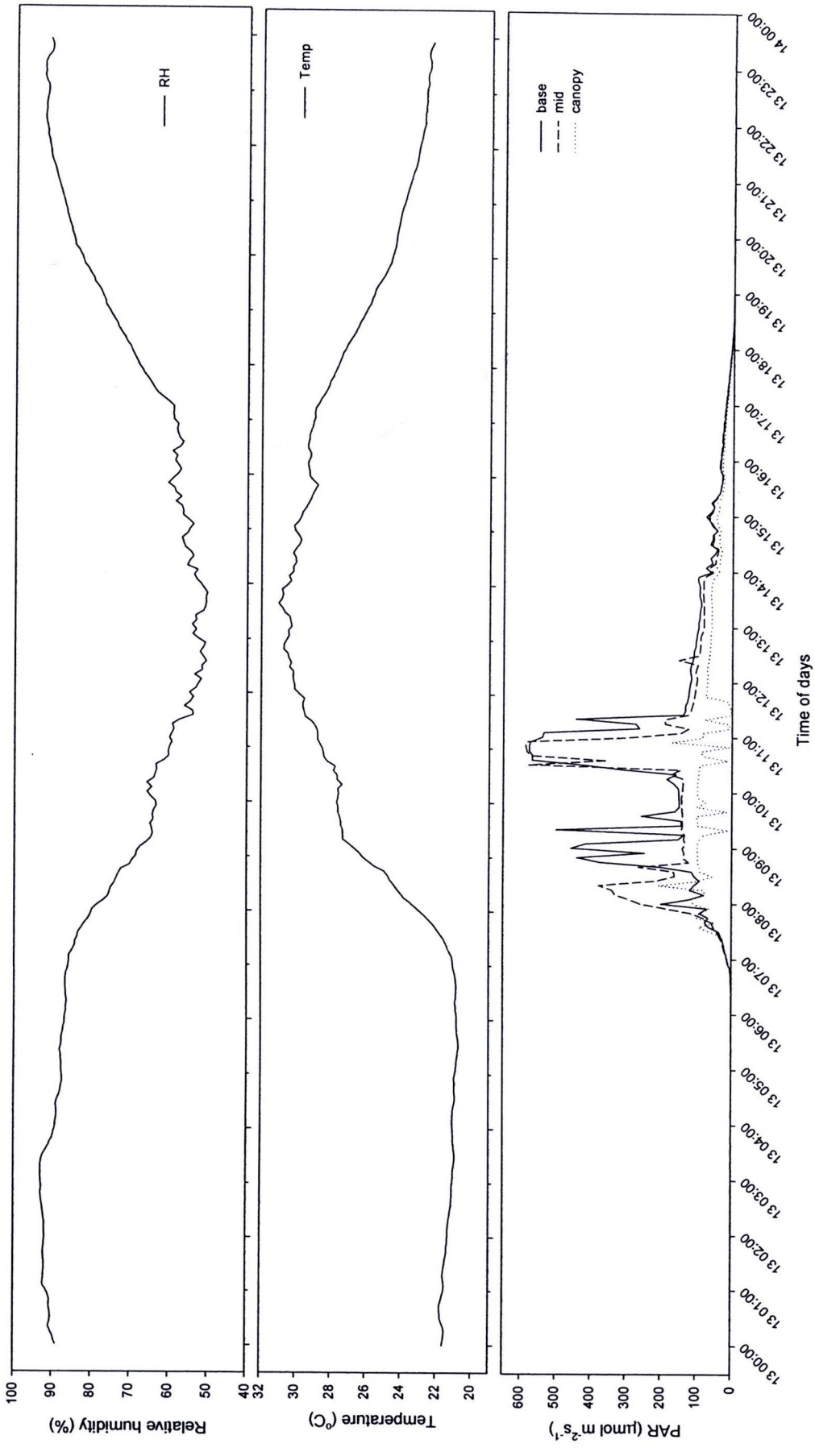

Figure 106 Microclimate of lichen habitat on *Schima wallichii* in SF recorded in 13 March 2004.

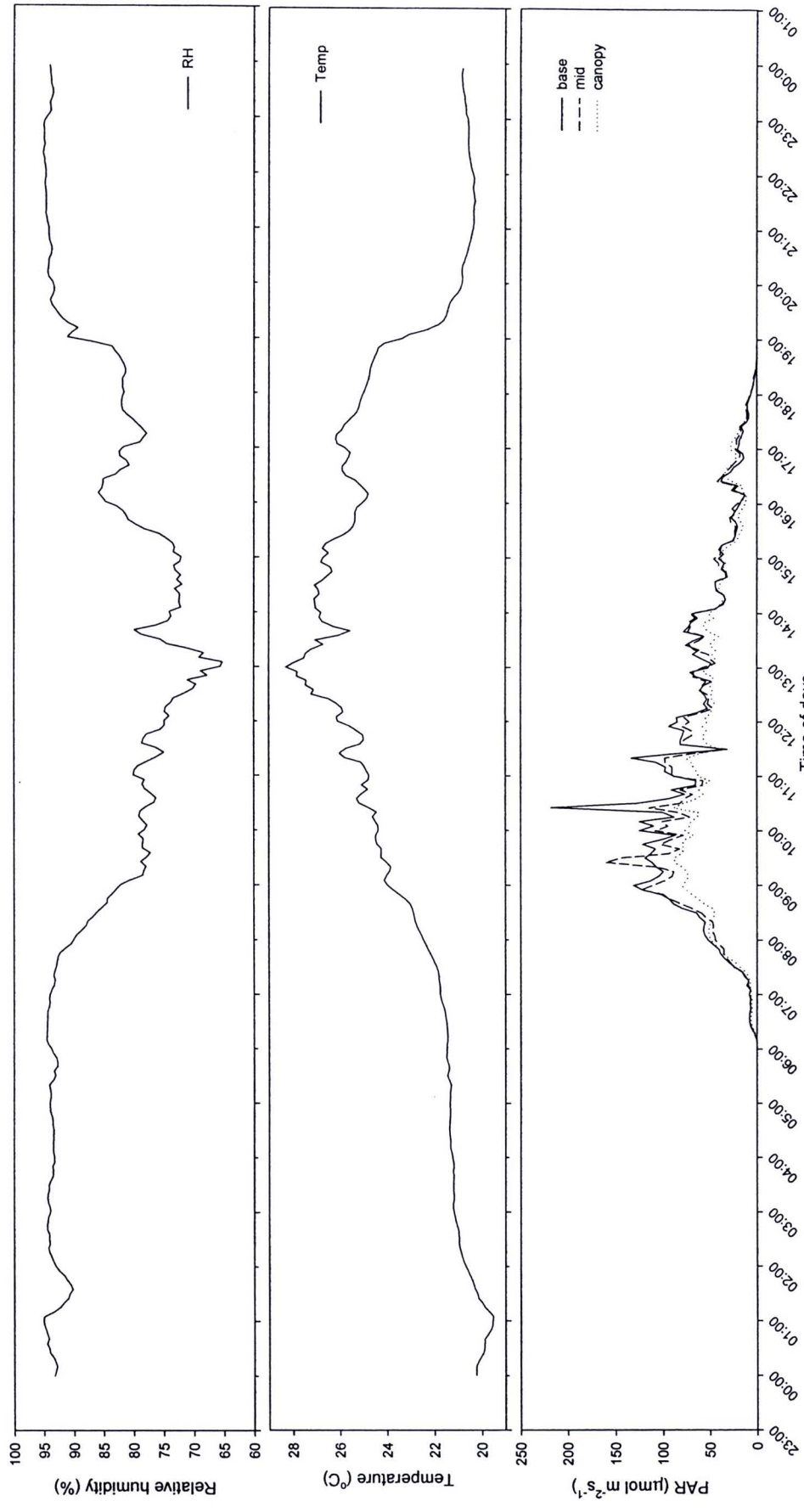

Figure 107 Microclimate of lichen habitat on *Schima wallichii* in SF recorded in 14 May 2004.

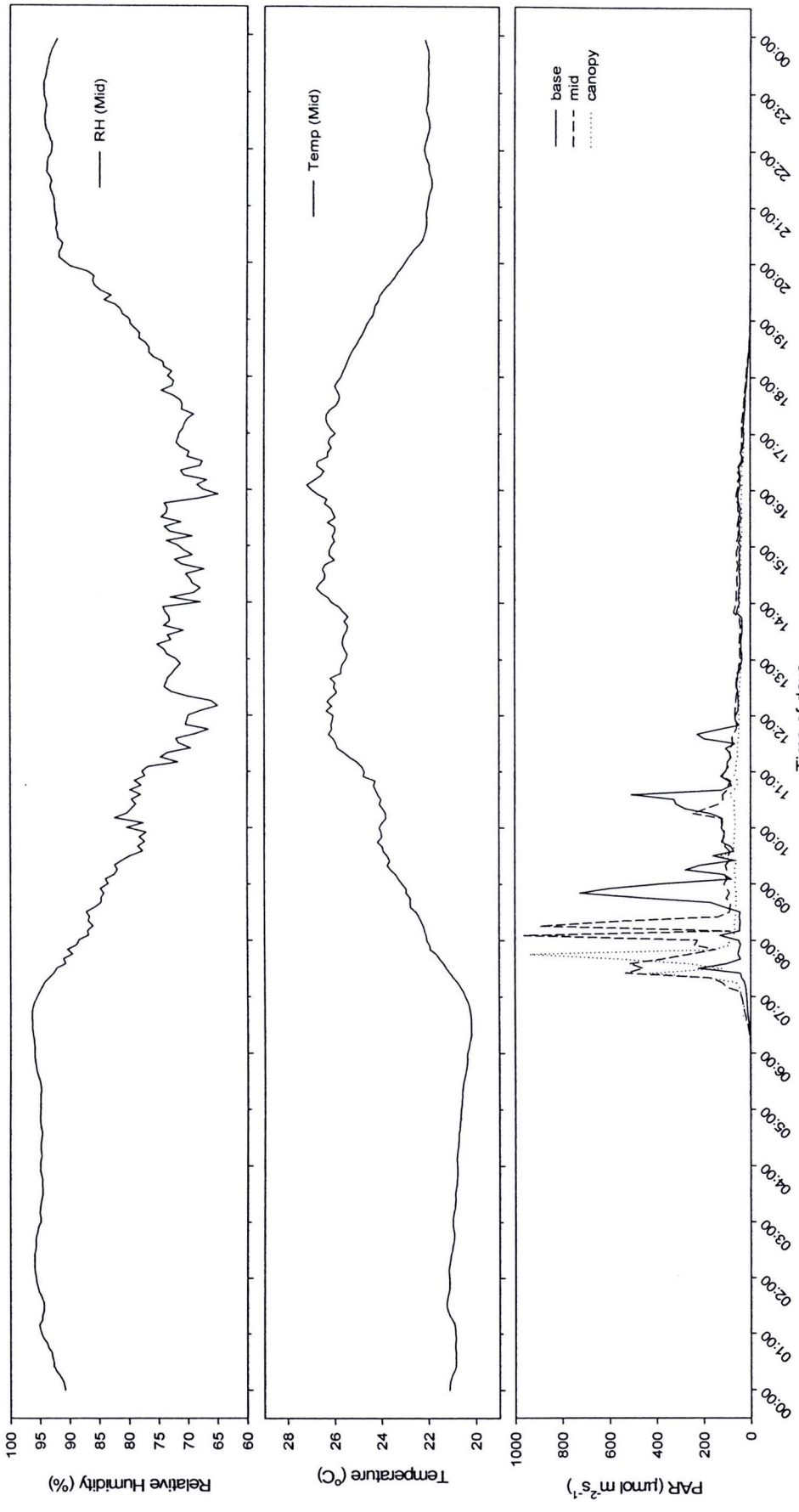

Figure 108 Microclimate of lichen habitat on *Schima wallichii* in SF recorded in18 July 2004.

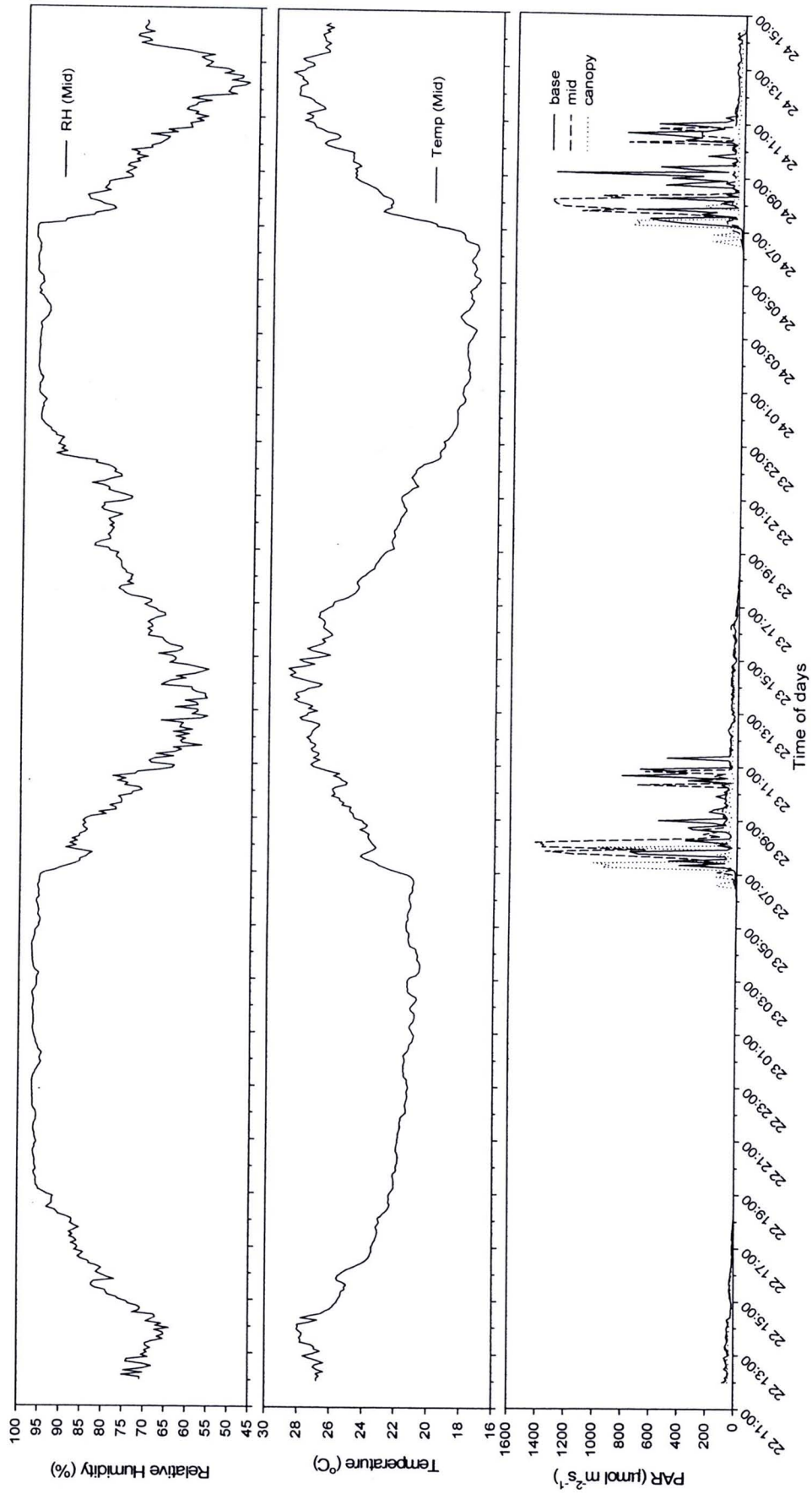

Figure 109 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 22-24 September 2004.

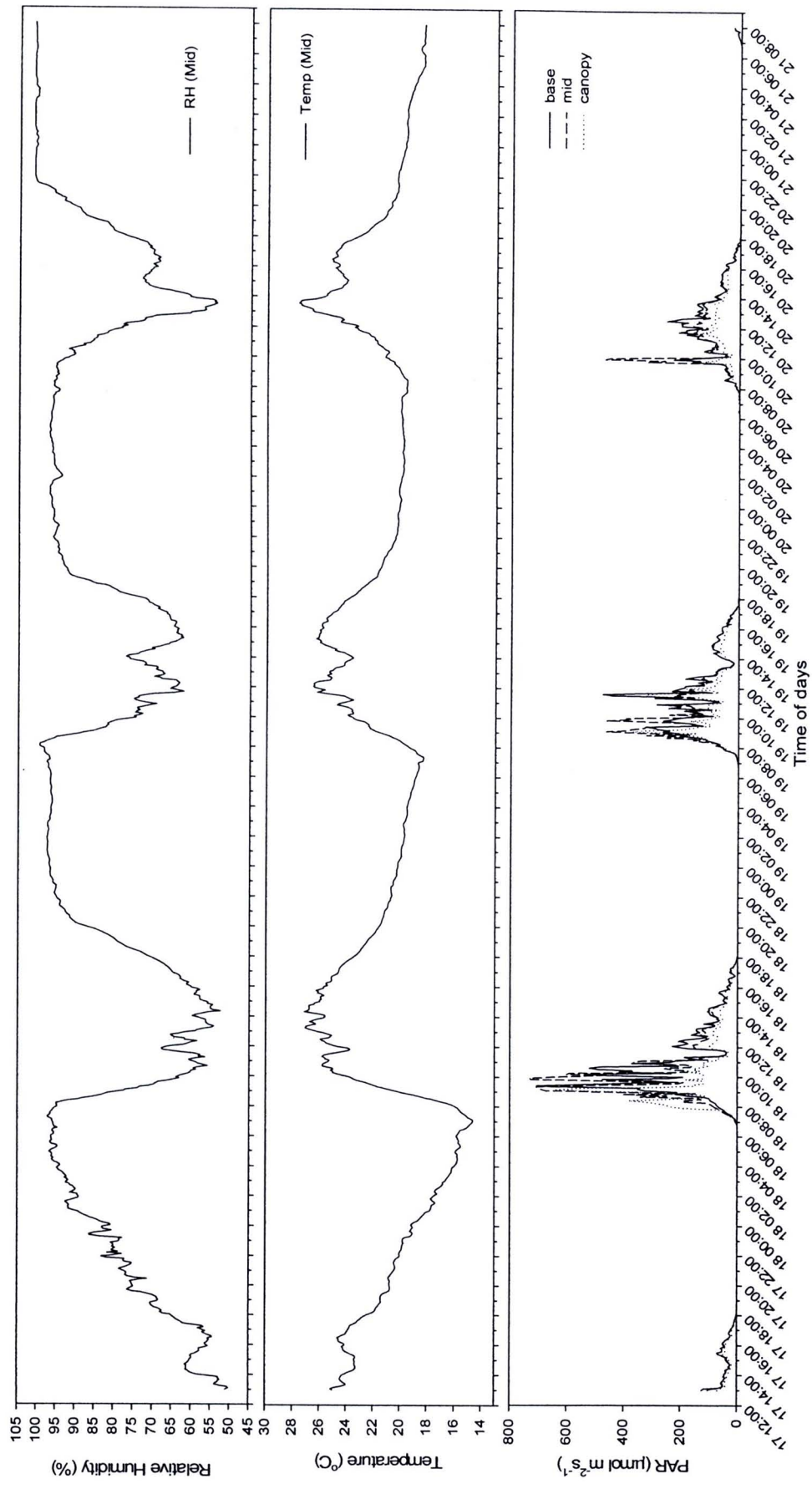

Figure 110 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 17-21 January 2005.

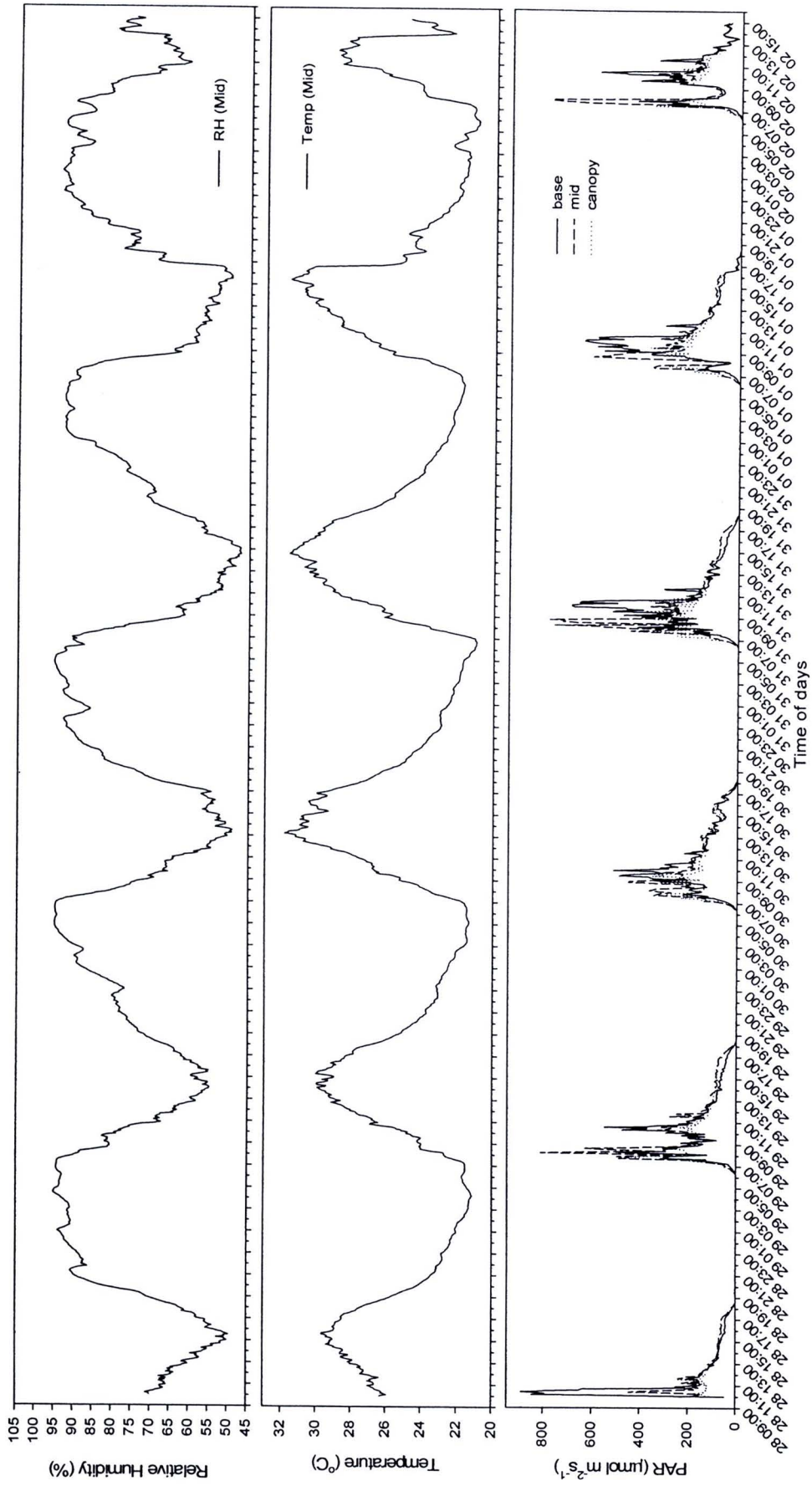

Figure 111 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 28 March to 2 April 2005.

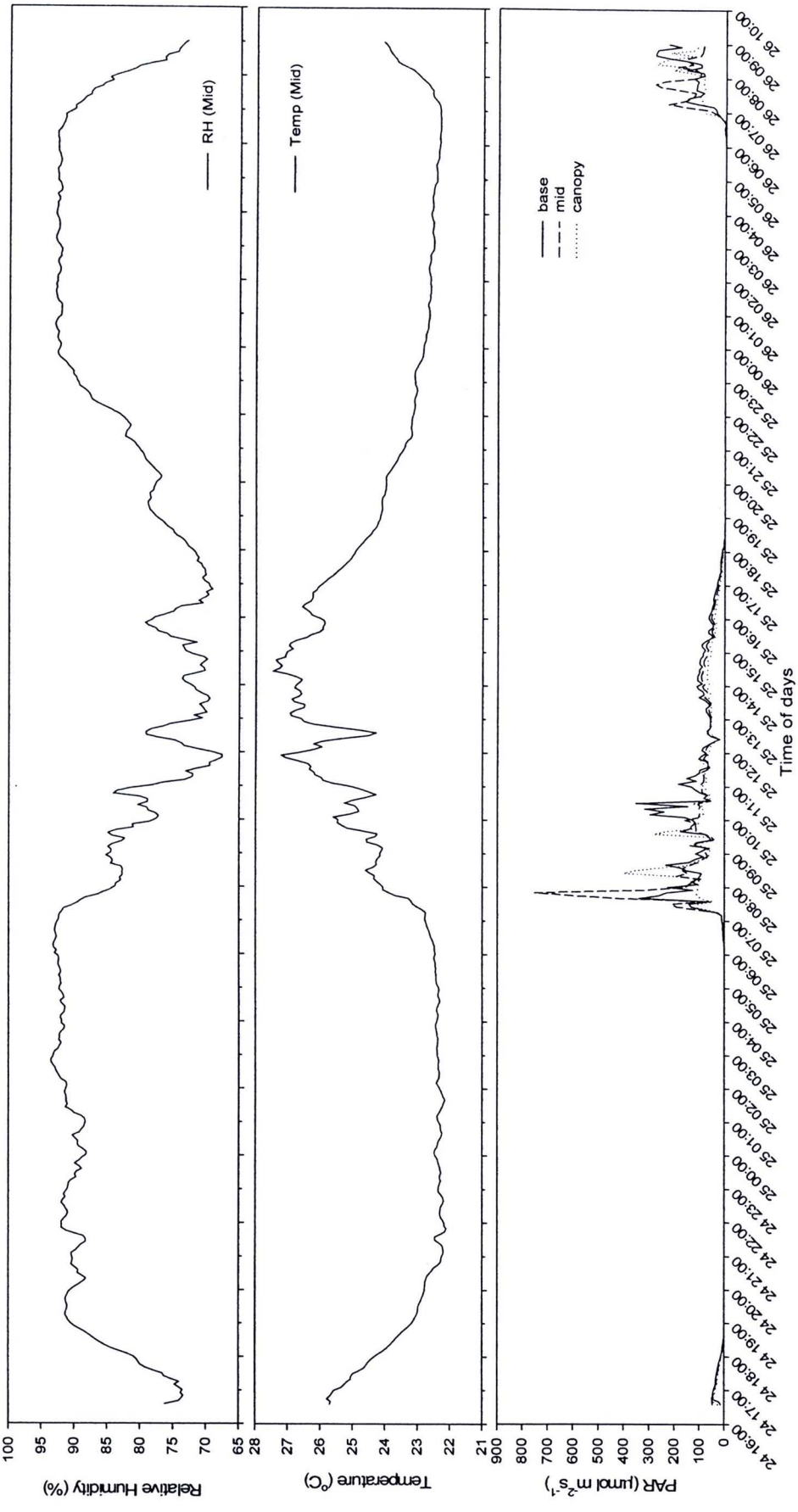

Figure 112 Microclimate of lichen habitat on *Schima wallichii* in SF recorded during 24-26 June 2005.

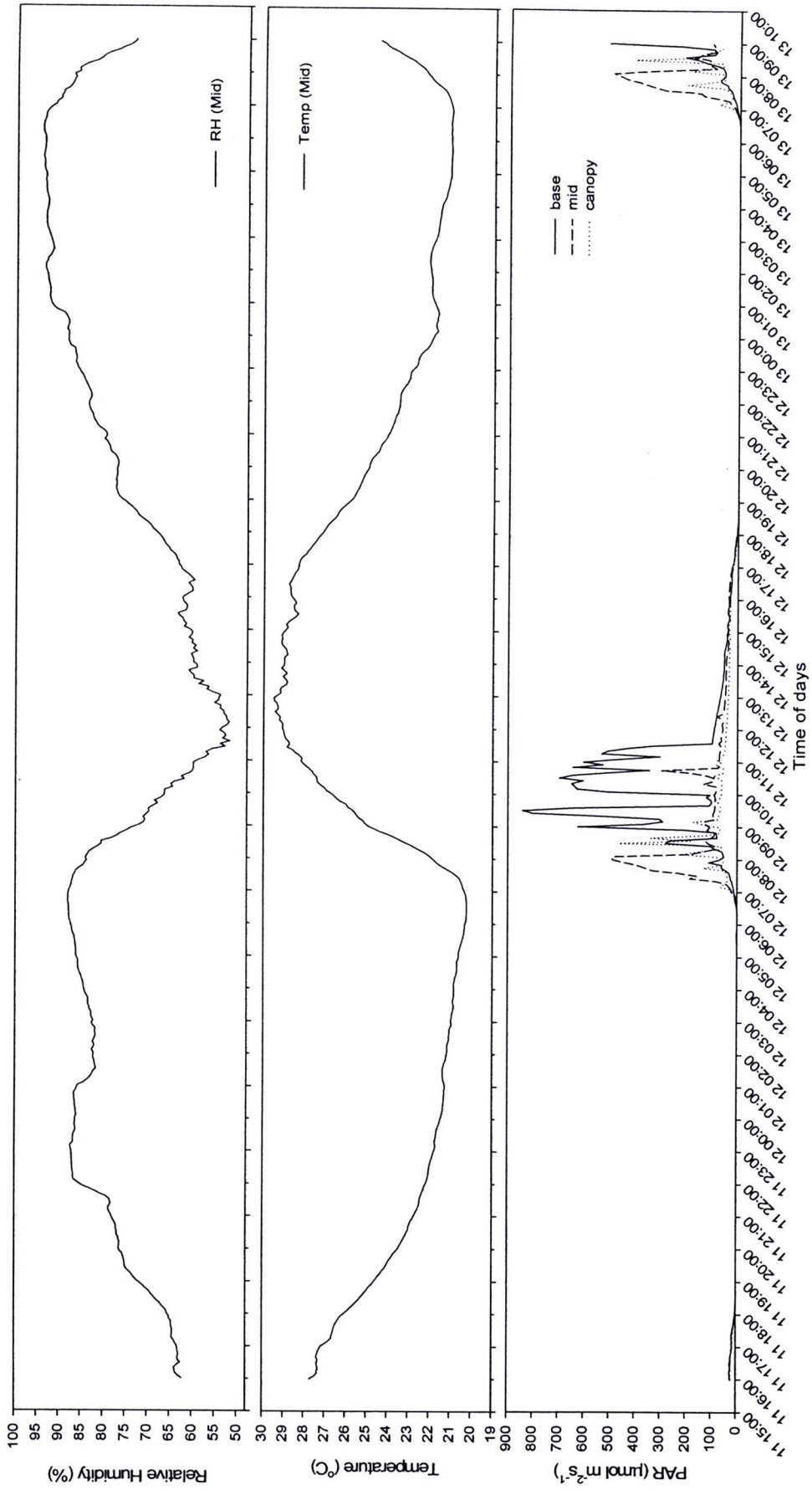

Figure 113 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 18-21 November 2005.

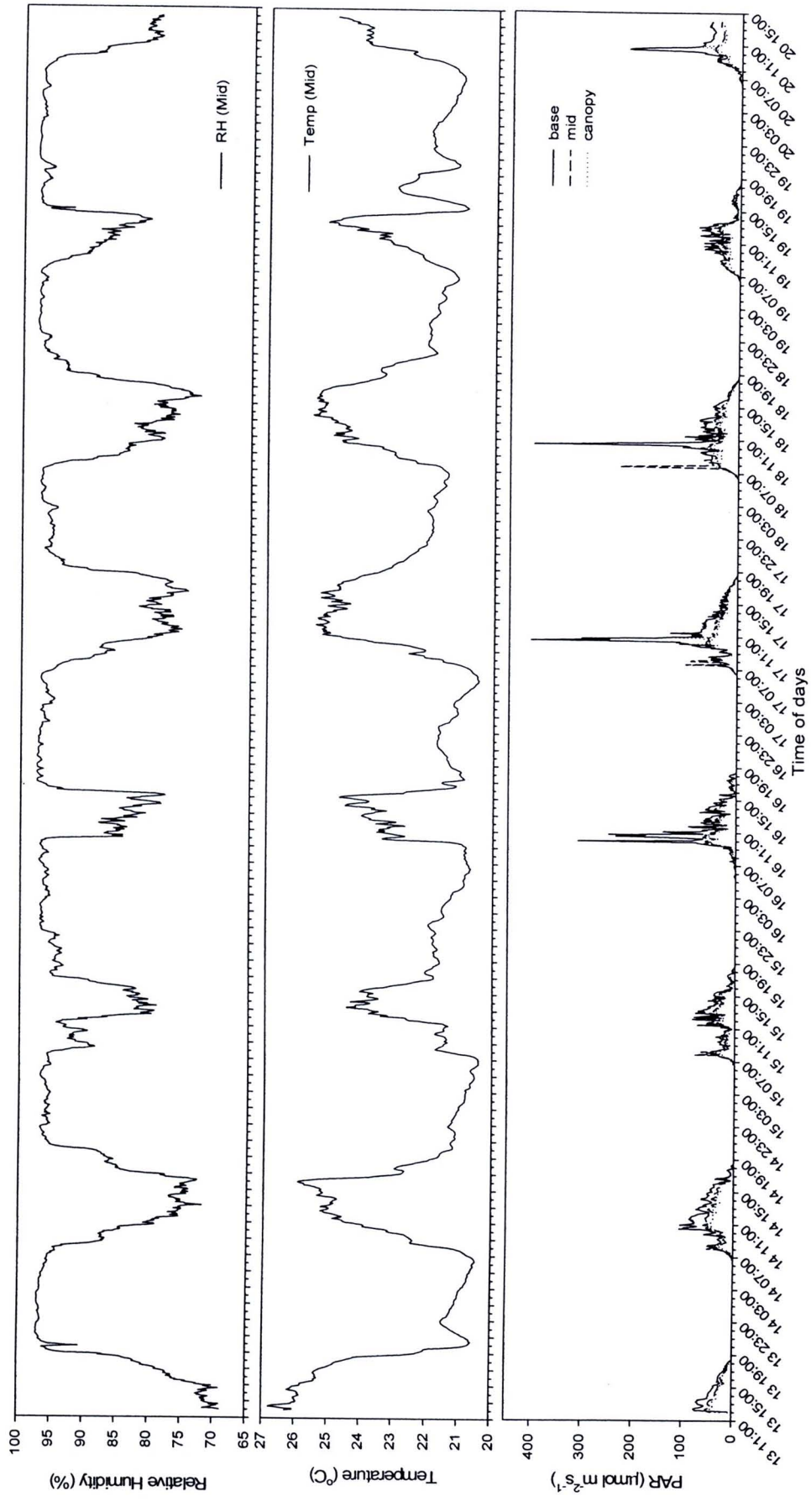

Figure 114 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 13-20 September 2006.

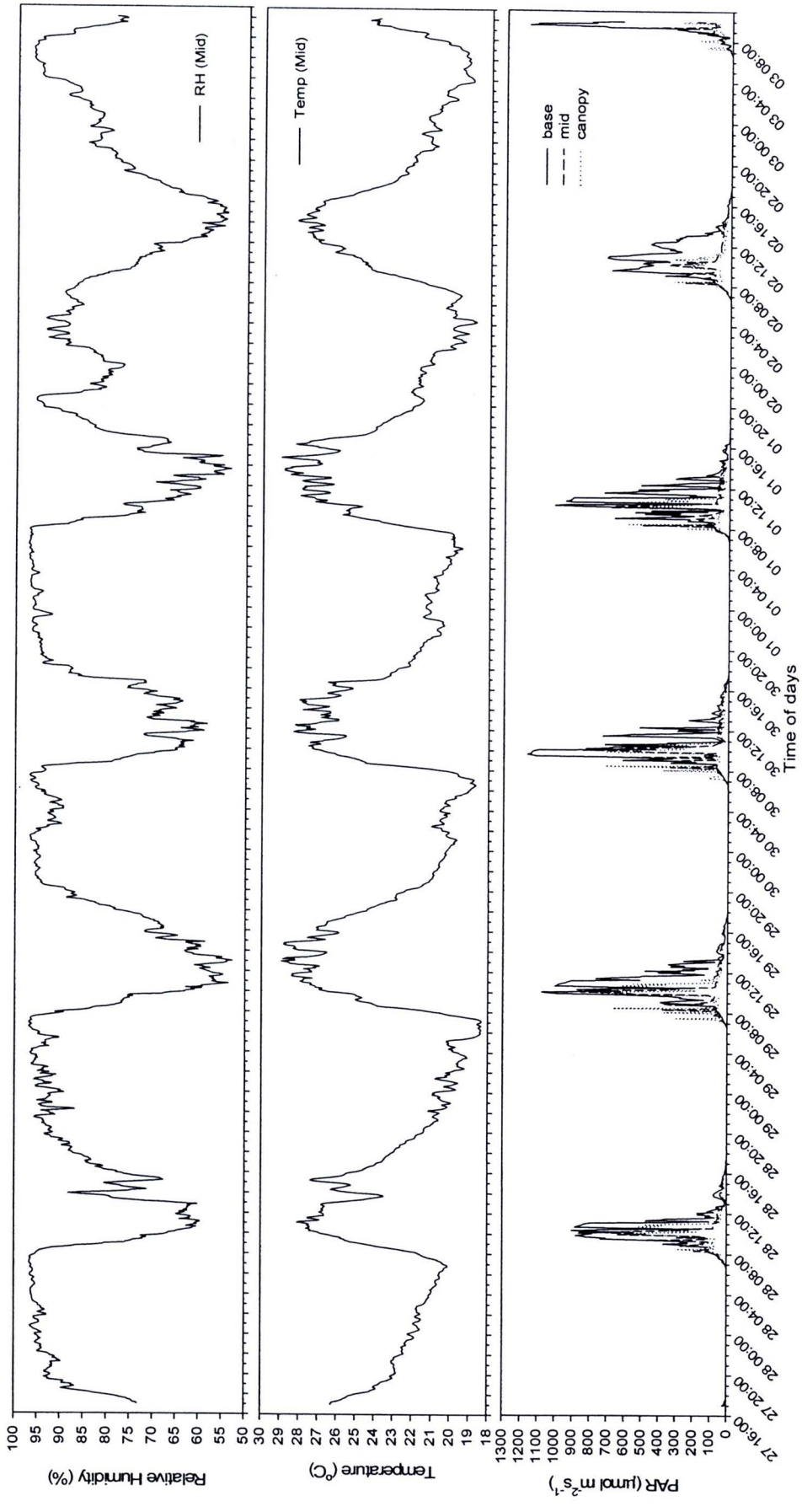

Figure 115 Microclimate of lichen habitat on *Schima wallichii* in LMF recorded during 27 November to 3 December 2006.

APPENDIX B

Data on Thallus Fragments of Lichens Transplanted in Various Ecosystems at KYNP

Survival of Thallus Fragments of Site-specific Species Transplanted in Various Ecosystems

Table 19

Thallus Survival of Site-Specific Species During 43 Months of Transplantion in Various Ecosystems

Ecosystems	Species	Thallus survival (%)					
		No. of months					
		1	6	13	21	31	43
LMF	*R. abstrusa*	100	86.7	-	-	71.7	66.7
	P. argyracea	100	77.1	77.1	77.1	65.7	51.4
	P. rubromarginatum	100	78.9	66.7	56.7	45.0	36.7
	D. picta	100	65.6	62.7	45.0	36.7	25.3
	R. subconnivens	100	57.5	52.2	32.2	28.9	18.9
	Average	100	73.2	64.7	52.8	49.6	39.8
SF	*P. chozoubae*	100	92.2	78.9	-	16.7	13.3
	H. lepidota	100	87.8	71.1	-	30.0	19.4
	H. kingii	100	93.3	90.0	-	26.7	23.3
	Average	100	91.1	80.0	-	24.5	18.7
DEF	*H. lepidota*	100	61.7	15.0	-	3.3	0.0
	P. chozoubae	100	78.0	51.3	-	3.3	2.2
	H. kingii	100	77.2	44.4	-	14.2	13.3
	H. osseoalba	100	63.3	36.7	-	10.0	8.9
	Average	100	70.7	42.1	-	10.2	7.9
TRF	*H. kingii*	100	54.1	32.4	-	11.2	9.4
	P. chozoubae	100	66.5	41.8	-	7.1	2.4
	H. lepidota	100	53.5	25.3	-	3.5	1.8
	H. osseoalba	100	58.2	32.7	-	11.8	6.4
	Average	100	58.1	33.1	-	8.4	5.0

Survival of Thallus Fragments of P. tinctorum Transplanted in Various Ecosystems.

Table 20

Survival of Thallus fragments of P. tinctorum Transplanted in Four Forest Types During 64 Months of Transplantation

No. of Months	month/year	Survivors (%)			
		TRF	DEF	LMF	SF
1	Aug-03	100*	-	-	-
2	Sep-03	nd.	100*	-	-
3	Oct-03	91.7	nd.	100*	-
4	Nov-03	nd.	92.8	nd.	-
5	Dec-03	79.2	nd.	90.8	100*
7	Feb-04	79.2	80.0	89.2	95.0
9	Apr-04	72.9	76.7	88.3	91.7
11	Jun-04	62.0	63.3	83.3	85.0
14	Sep-04	42.7	58.3	78.3	83.3
18	Jan-05	38.5	35.0	65.0	73.3
27	Oct-05	25.5	26.1	52.0	71.7
30	Jan-06	19.8	nd.	nd.	nd.
35	Jun-06	17.19	21.7	50.0	51.7
45	Apr-07	9.9	12.78	46.67	36.67
53	Jan-08	6.77	10	41.67	28.33
64	Dec-08	6.77	6.67	37.50	28.33

Note. * Started transplantation in August 2003 and terminated in December 2008.

nd. = No data collected.

Table 21

One-Way ANOVA Showed Differences of Host Trees in each Ecosystem on Growth Rate of P. tinctorum During 62 Months of Transplantation

Host trees	Ave. Growth rate (mm/months)	SD	*P*
Tropical Rain Forest (TRF)			
TRF1 *Terminalia citrina* (30m)	0.107	0.0687	0.031*
TRF2 *Hopea ferrea* (21m)	0.143	0.0812	
TRF3 Unknown 1 (21m)	0.244	0.136	
Average	0.165		
Secondary Forest (SF)			
SF1 *Schima wallichii* (10.5m)	0.228	0.149	0.924
SF1 *Syzygium cumini* (12m)	0.235	0.119	
Average	0.232		*ns*
Lower Montane Rain Forest (LMF)			
LMF1 *Dacrydium elatum* (21m)	0.370	0.0839	0.944
LMF1 *Schima wallichii* (13.5m)	0.361	0.0887	
LMF1 *Castanopsis* sp.(13.5m)	0.379	0.145	
Average	0.37		*ns*
Dry Evergreen rain Forest (DEF)			
DEF1 Unknown 2 (21m)	0.178	0.0802	0.002*
DEF1 *Terminalia* sp. (24m)	0.175	0.132	
DEF1 *Hopea ferrea* (21m)	0	0	
Average	0.177		*ns*

Note. * Significant differences, *ns* = no differences, m = meter (trees height).

Table 22

The Average Growth Rate at Various Levels of Trees Height in Various Ecosystems

Ecosystems	Levels		
	Tree Base	Mid-trunk	Canopy
LMF	0.28 (±0.06)	0.29 (±0.05)	0.34 (±0.03)
SF	0.22 (±0.03)	0.21(±0.11)	0.23 (±0.04)
DEF	0	0.15 (±0.04)	0.23 (±0.04)
TRF	0.07	0.19 (±0.04)	0.16 (±0.07)
Average	0.188	0.212	0.240

APPENDIX C

Relative Growth Rate of Lichens After Transplantation

Relative Growth Rates of Specific-Sites Species of Lichens after Transplantation to different ecosystems at KYNP

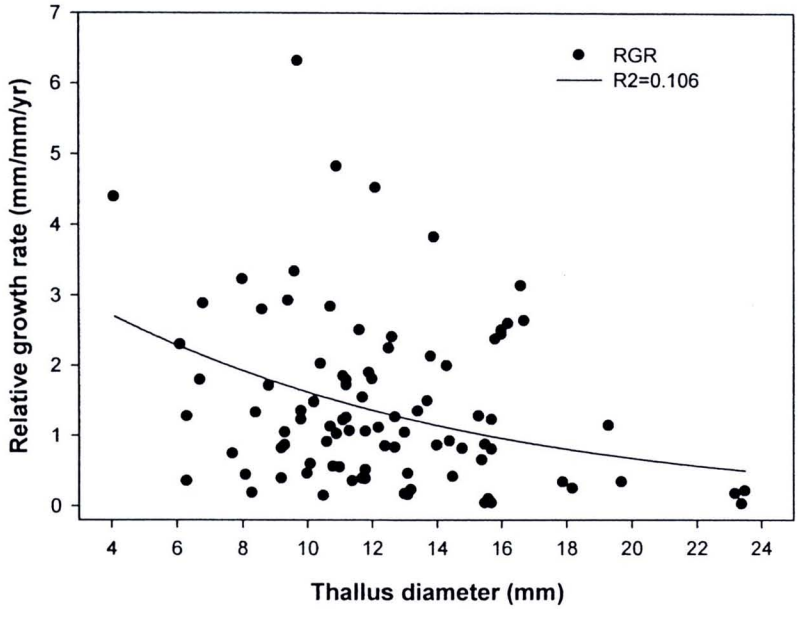

Figure 116 Relative growth rate of *Hypotrachyna kingii* after transplanted from cool to warm sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

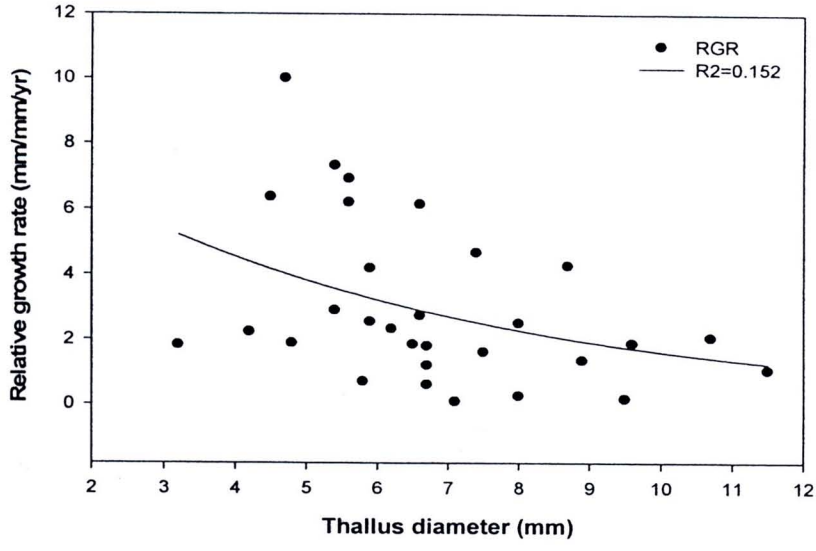

Figure 117 Relative growth rate of *Hypotrachyna osseoalba* after transplanted from cool to warm sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

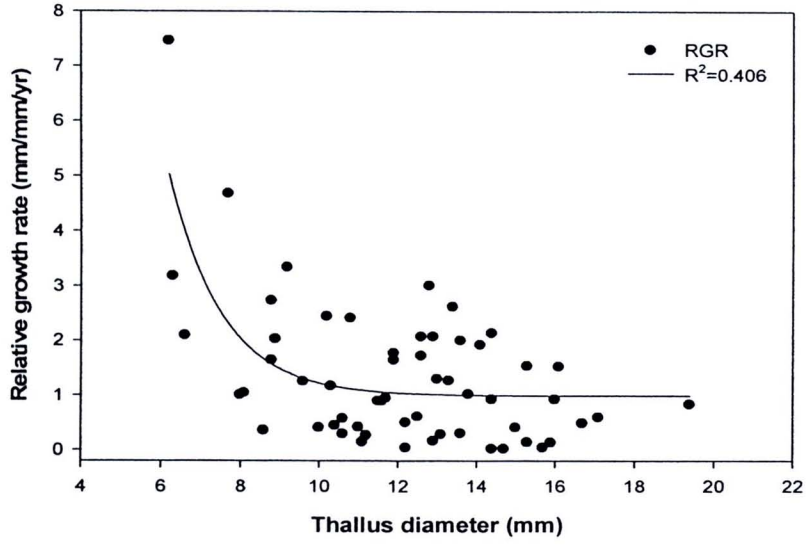

Figure 118 Relative growth rate of *Parmelinella chozoubae* after transplanted from cool to warm sites.

Note. From researcher; the model of equation was by Exponential Decay, Single, 3 Parameter [f=y0+a*exp(-b*x)].

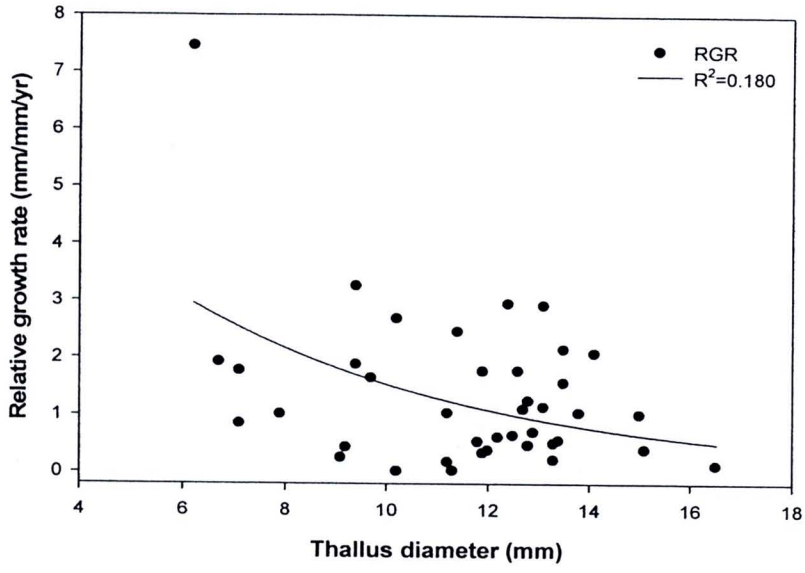

Figure 119 Relative growth rate of *Heterodermia lepidota* after transplanted from cool to warm sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

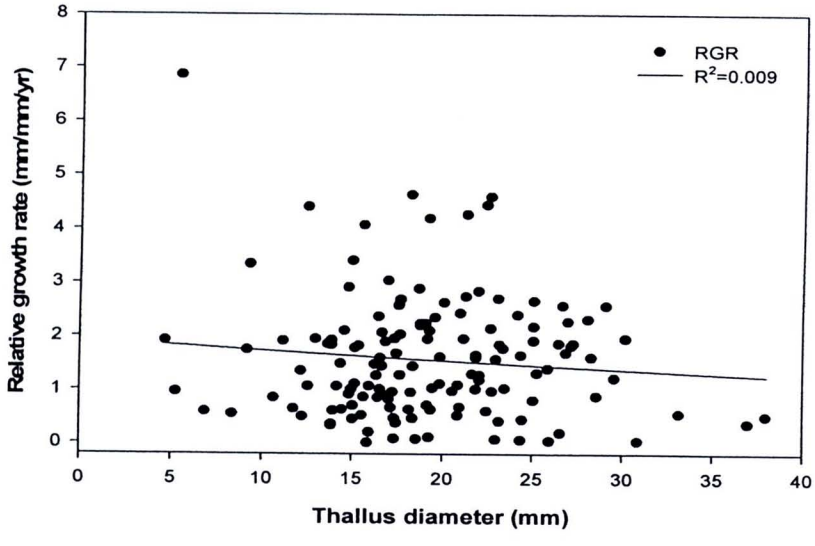

Figure 120 The relative growth rate of *Parmotrema rubromarginatum* after transplanted from warm to cool sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

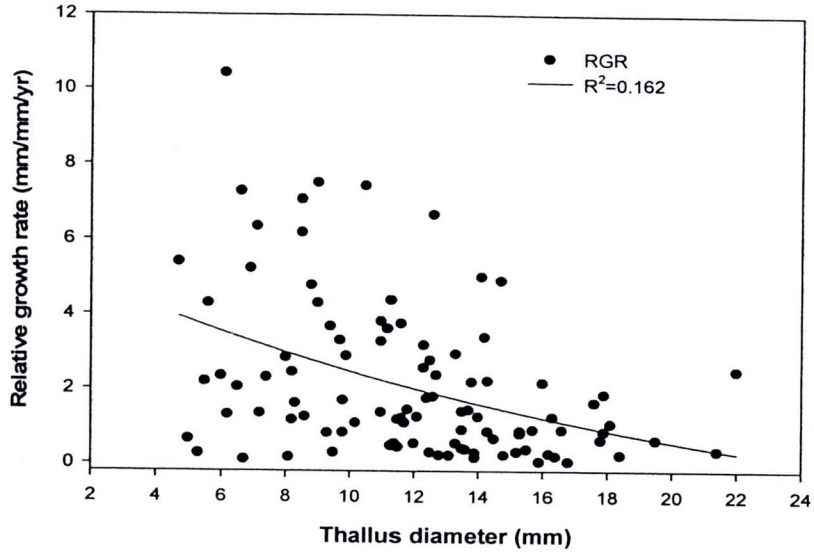

Figure 121 Relative growth rate of *Dirinaria picta* after transplanted from warm to cool sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 3 Parameter [f=y0+a*exp(-b*x)].

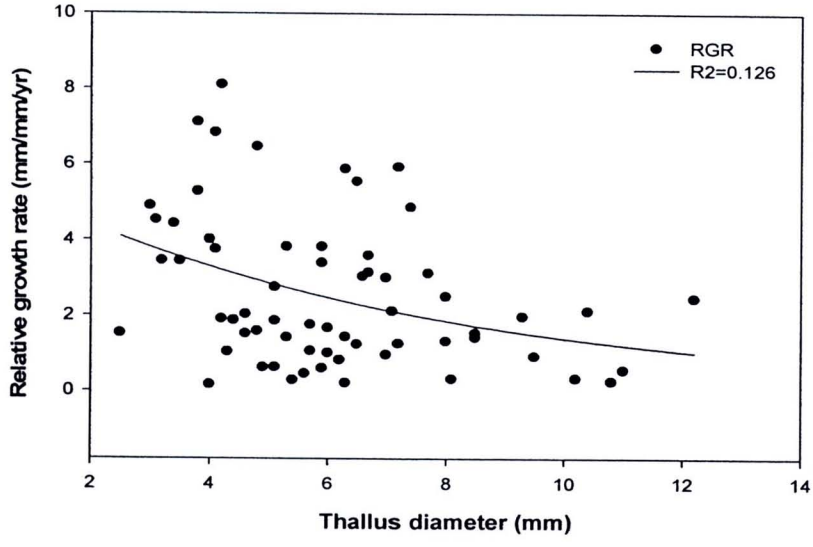

Figure 122 Relative growth rate of *Relicina abstruse* after transplanted from warm to cool sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

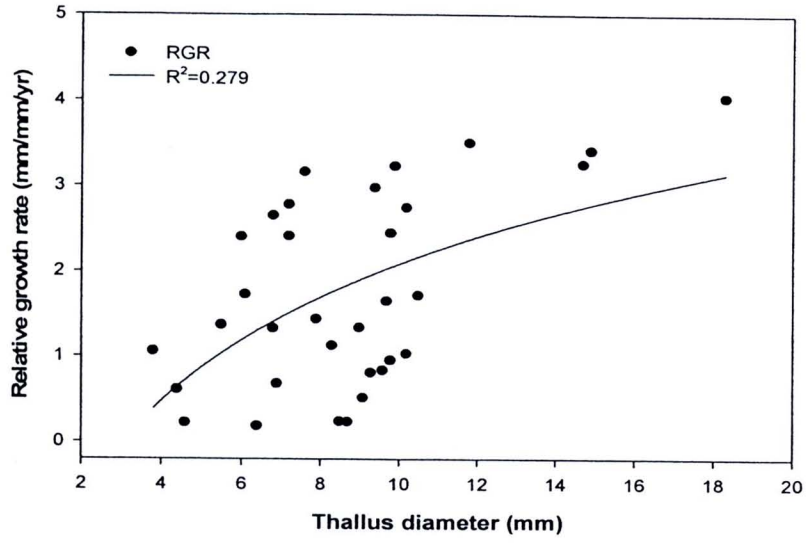

Figure 123 Relative growth rate of *Relicina subconnivens* after transplanted from warm to cool sites.

Note. From researcher; the model of equation was Logarithm, 2 Parameter I [f=if(x>0, y0+a*ln(abs(x)), 0)].

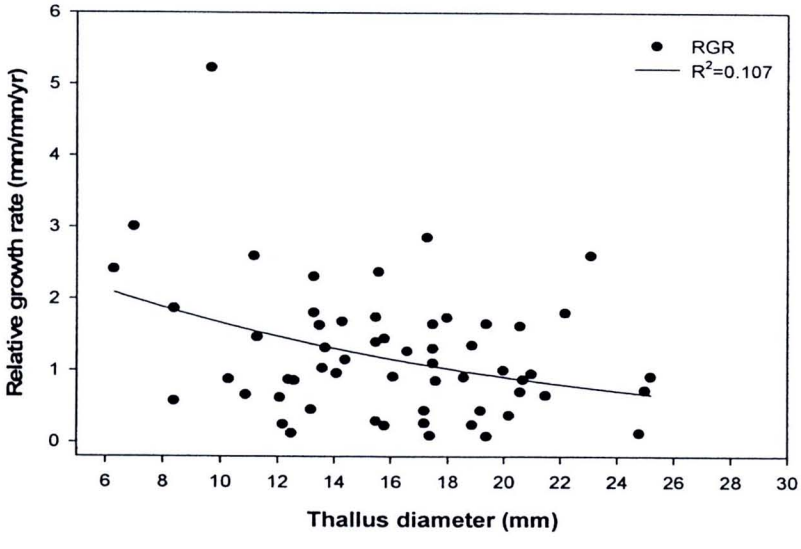

Figure 124 Relative growth rate of *Pseudocyphellaria argyracea* after transplanted from warm to cool sites.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

Relative Growth Rate of Thallus Fragments of P. Tinctorum Transplanted on Three Substrates in Secondary Forest at KYNP

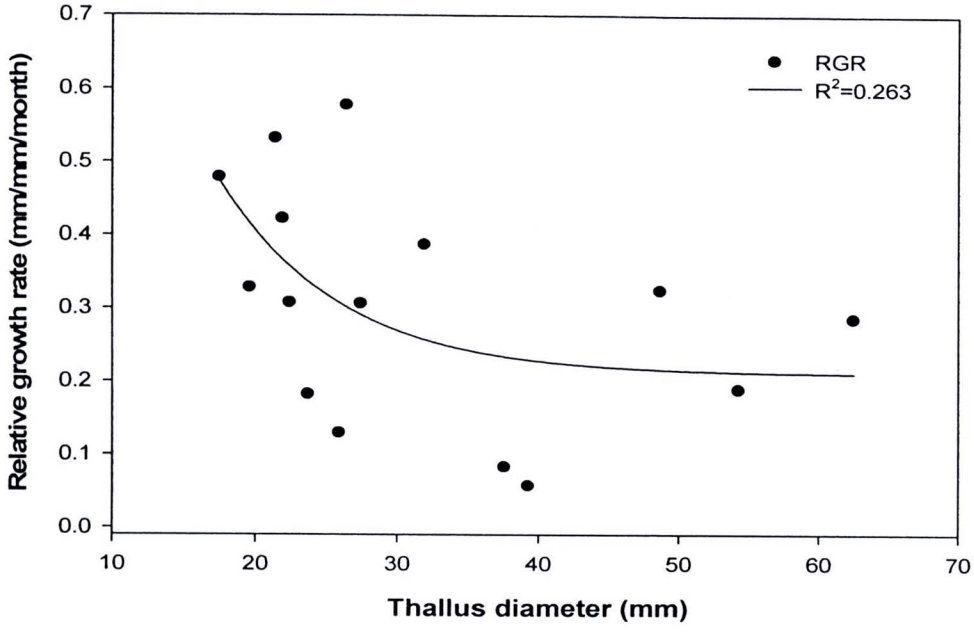

Figure 125 Relative growth rate of thallus fragments transplanted on polycarbonate plates.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

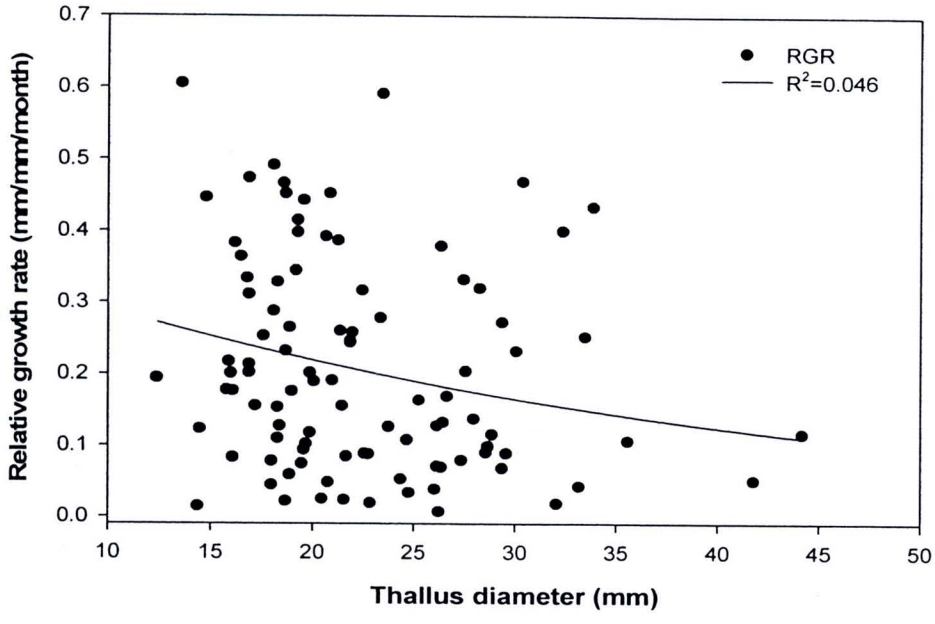

Figure 126 Relative growth rate of thallus fragments transplanted on plastic nets.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

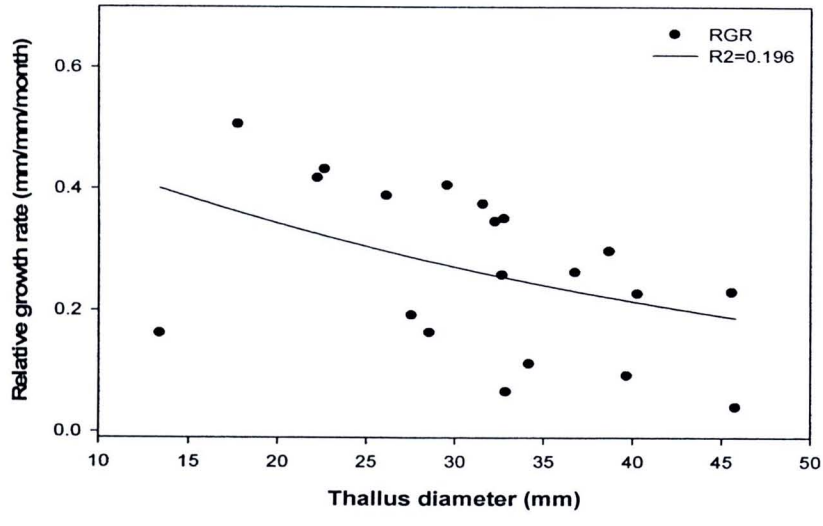

Figure 127 Relative growth rate of thallus fragments transplanted on ceramic tiles.

Note. From researcher; the model of equation was Exponential Decay, Single, 2 Parameter [f = a*exp(-b*x)].

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