APPENDIX

The characteristics of new mungbean lines derived from the backcrossing method to the recurrent parent CN84-1.

Figure A.1 Appearance characteristics of the new mungbean line P08.

Figure A.2 Appearance characteristics of the new mungbean line P12.

Figure A.3 Appearance characteristics of the new mungbean line P22.

Figure A.4 Appearance characteristics of the new mungbean line P24.

The characteristics of new mungbean lines derived from the backcrossing method to the recurrent parent SUT1.

Figure A.5 Appearance characteristics of the new mungbean line D5.

The weather information of experimental field during the rainy and dry seasons 2023-2024

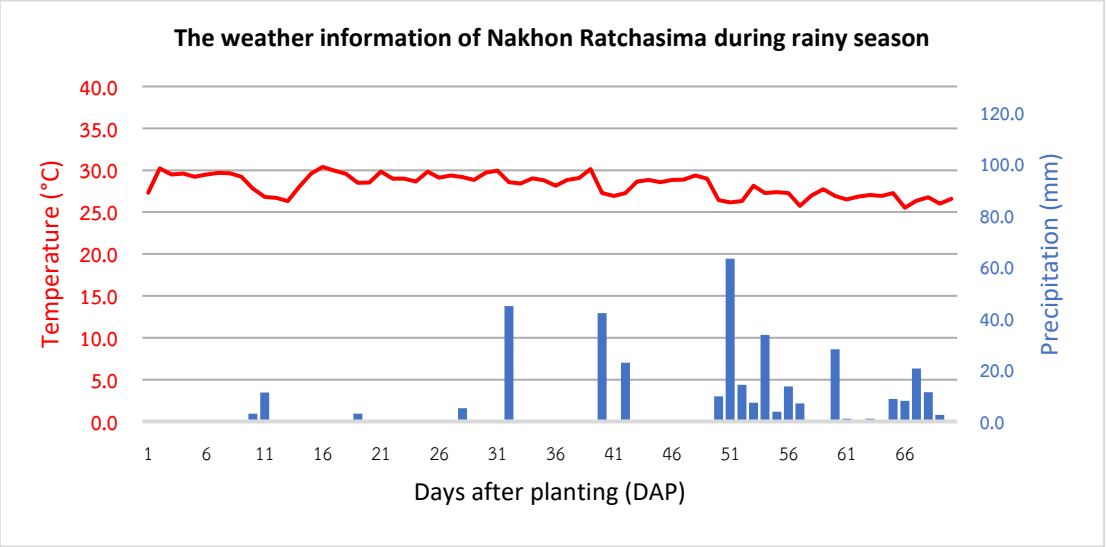

Figure A.6 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Nakhon Ratchasima during rainy season between July 11, 2023 – September 18, 2023, based on the Days after planting of mungbean (x-axis).

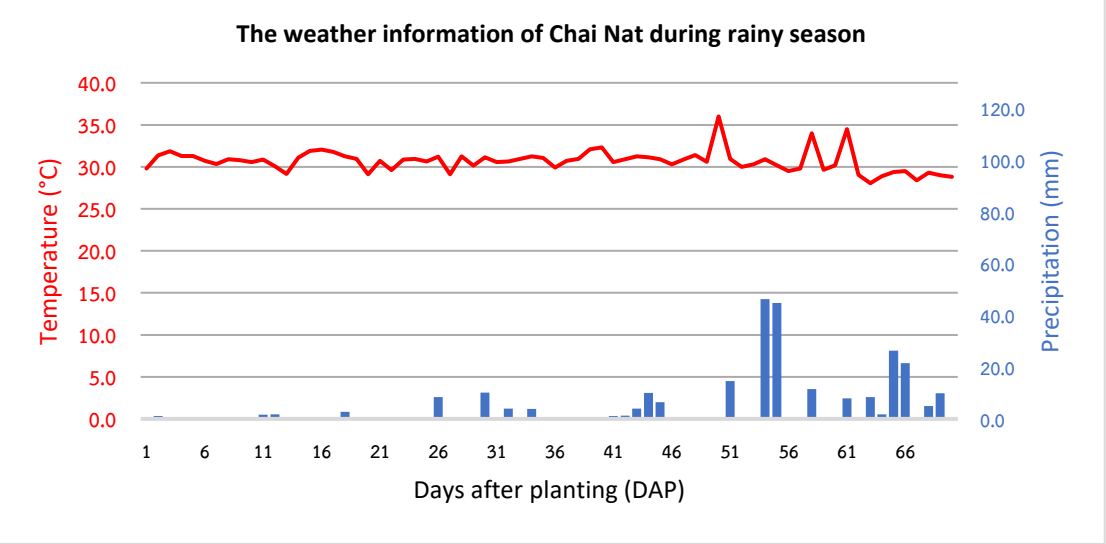

Figure A.7 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Chai Nat during rainy season between July 12, 2023 – September 19, 2023, based on the Days after planting of mungbean (x-axis).

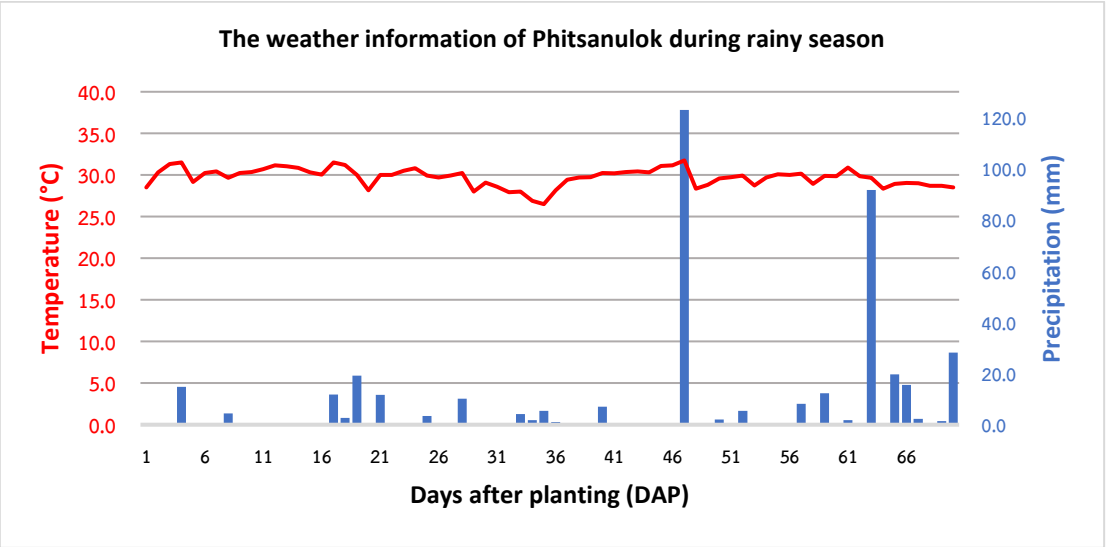

Figure A.8 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Phitsanulok during rainy season between July 7, 2023 – September 14, 2023, based on the Days after planting of mungbean (x-axis).

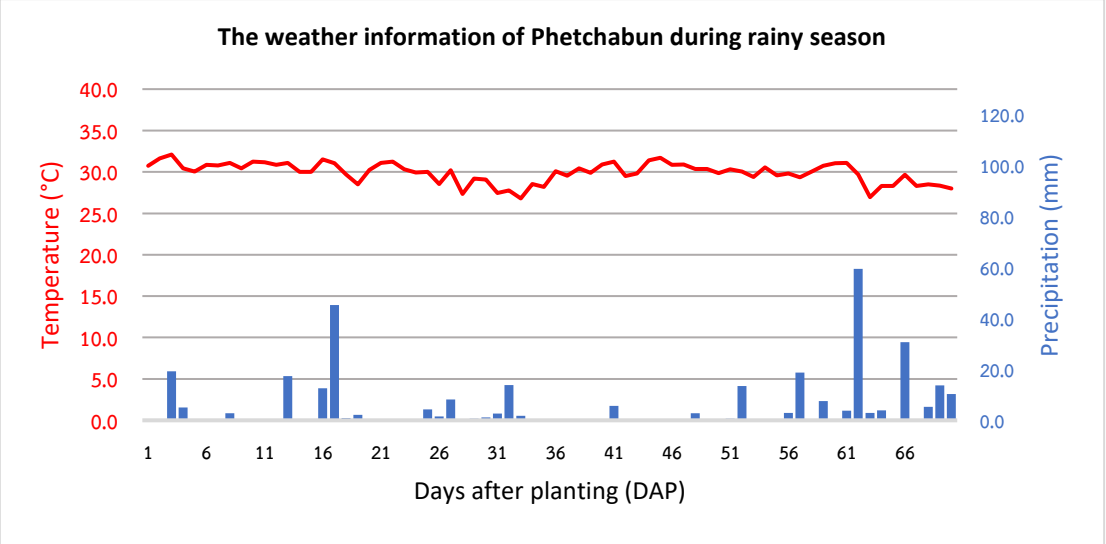

Figure A.9 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Phetchabun during rainy season between July 6, 2023 – September 13, 2023, based on the Days after planting of mungbean (x-axis).

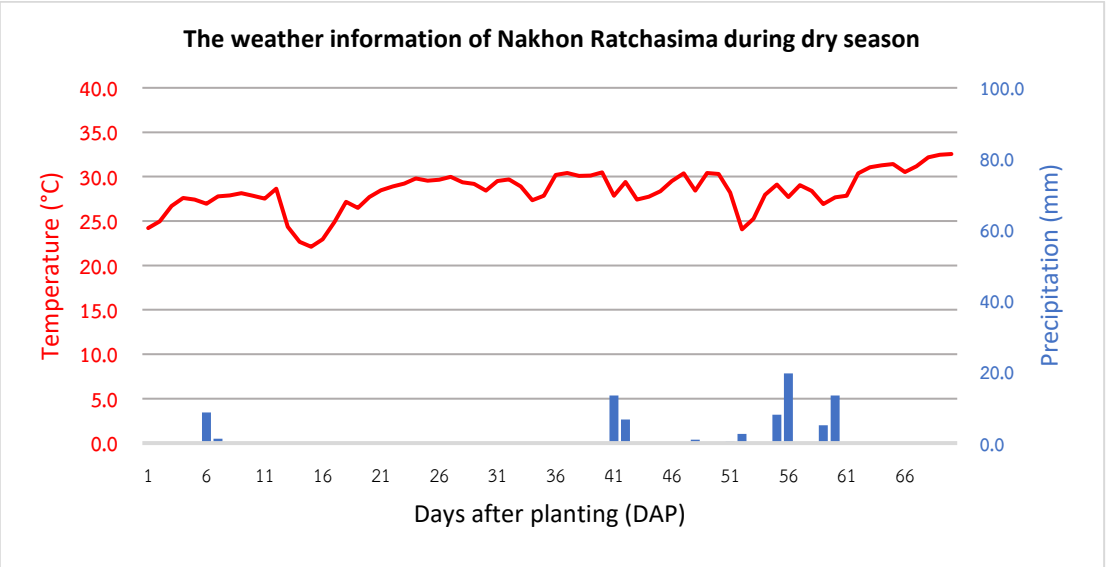

Figure A.10 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Nakhon Ratchasima during dry season between January 29, 2024 – April 7, 2024, based on the Days after planting of mungbean (x-axis).

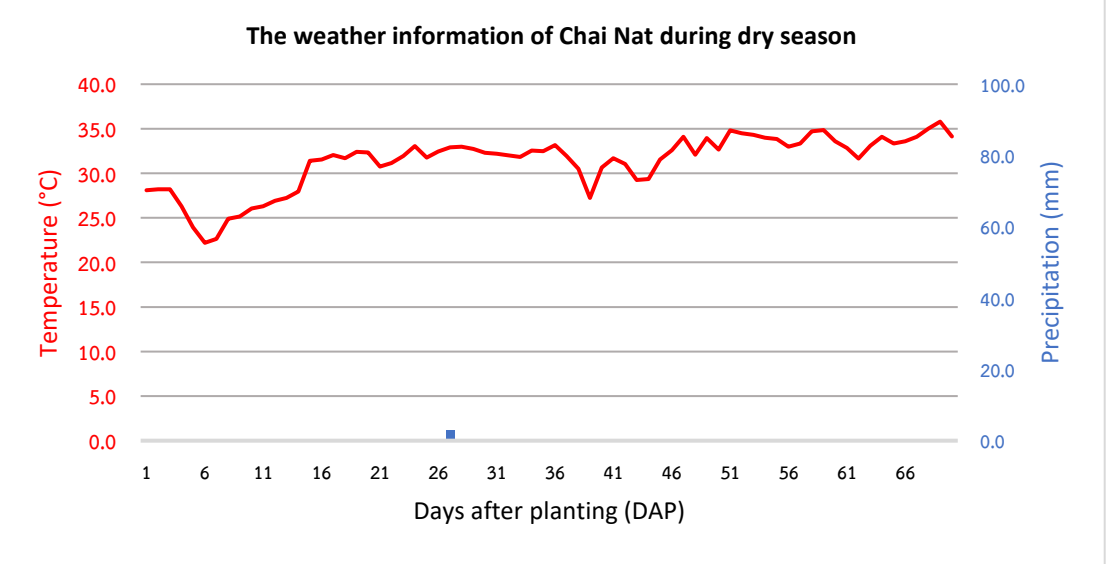

Figure A.11 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Chai Nat during dry season between December 18, 2023 – February 25, 2024, based on the Days after planting of mungbean (x-axis).

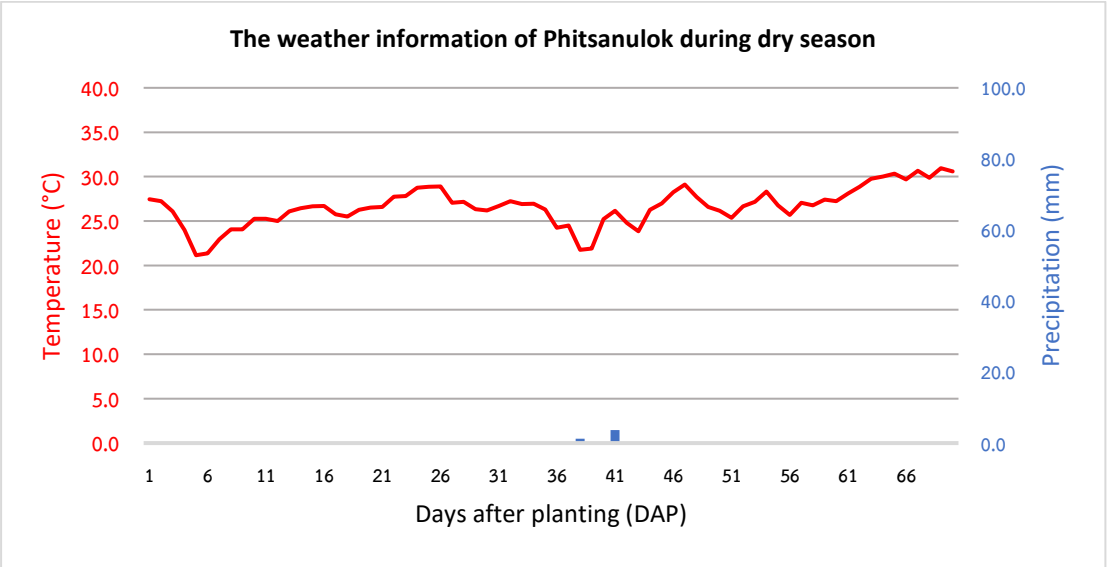

Figure A.12 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Phitsanulok during dry season between December 19, 2023 - February 26, 2024, based on the Days after planting of mungbean (x-axis).

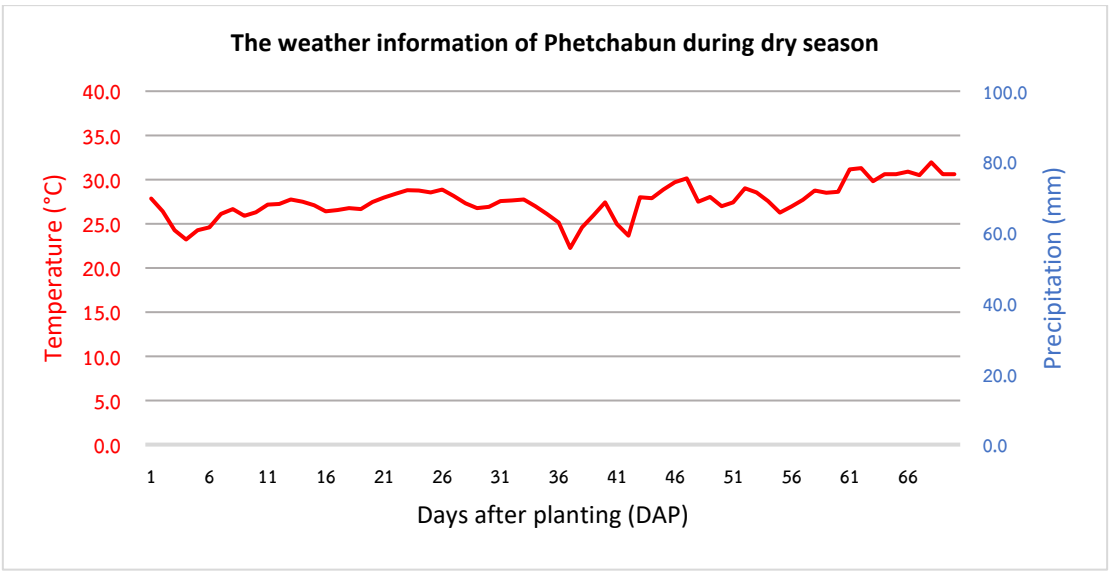

Figure A.13 The Weather information of air temperature (°C; left y-axis) and precipitation rates (mm; right y-axis) at Phetchabun during dry season between December 20, 2023 - February 27, 2024, based on the Days after planting of mungbean (x-axis).

Table A.1 Details of the geographic position and meteorological variables that prevailed at the three locations during the experimental period.

Details	**Locations**			
Experimental site	**Nakhon Ratchasima**	**Chai Nat**	**Phitsanulok**	**Phetchabun**
Agro-climatic zone	Tropical savanna climate			
Latitude	14°52'37.6"N	15°09'08.3"N	16°50'13.7"N	16°27'21.3"N
Longitude	102°00'15.2"E	100°10'55.1"E	100°22'59.1"E	101°10'00.8"E
Altitude (MSL)	227	17	45	119
pH (soil:water; 1:2)	6.77	6.22	6.29	6.00
EC (uS/cm)	126.03	94.27	58.99	83.76
OM (%)	1.13	1.47	0.70	3.30
N (%)	0.06	0.09	0.04	0.17
P (mg/kg)	26.64	40.33	100.10	27.10
K (mg/kg)	99.73	60.87	27.10	167.26
Soil texture	Sandy Loam	Clay Loam	Sandy Loam	Clay

Assessment of powdery mildew disease

- Score 1: indicates no symptoms of the disease.
- Score 2: indicates the presence of 2-3 lesions on the lower leaves.
- Score 3: indicates the presence of 2-3 lesions on the lower leaves with sporulation.
- Score 4: indicates the presence of numerous lesions on the lower and middle leaves with sporulation.
- Score 5: indicates similar symptoms to score 4, with yellowing or drying of leaves and abundant sporulation.
- Score 6: indicates symptoms like score 5, visible from a distance, with abundant sporulation.
- Score 7: indicates lesions throughout the plant but not exceeding 25% leaf dryness.
- Score 8: indicates symptoms like score 7, with 25-50% leaf dryness.
- Score 9: indicates more than 50% leaf dryness.

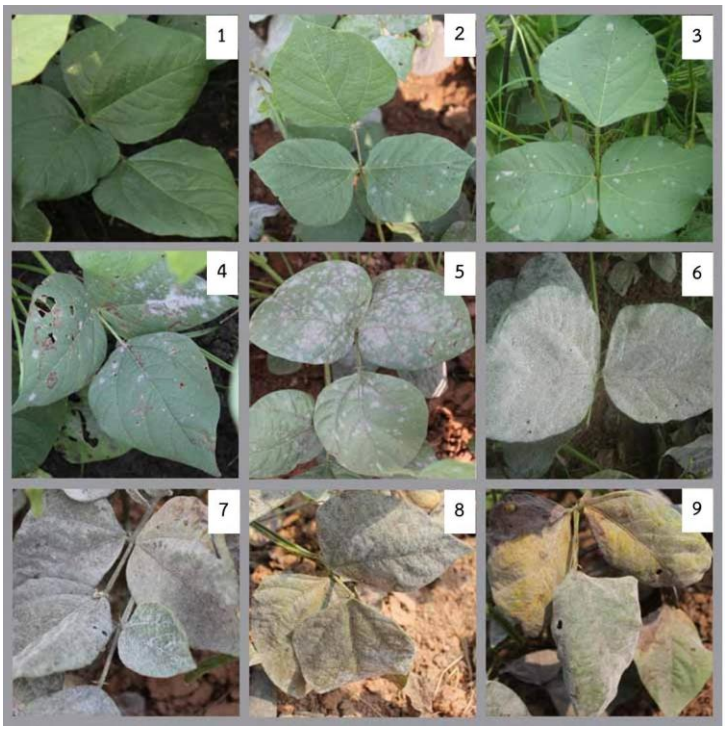

Figure A.14 Scoring criteria for assessing powdery mildew symptoms in mungbean.

Assessment of Cercospora leaf spot disease

- Score 1: Indicates disease incidence at 0% of total leaf area.
- Score 2: Indicates disease incidence at 1-25% of total leaf area.
- Score 3: Indicates disease incidence at 26-50% of total leaf area.
- Score 4: Indicates disease incidence at 51-75% of total leaf area.
- Score 5: Indicates disease incidence at 76-100% of total leaf area.

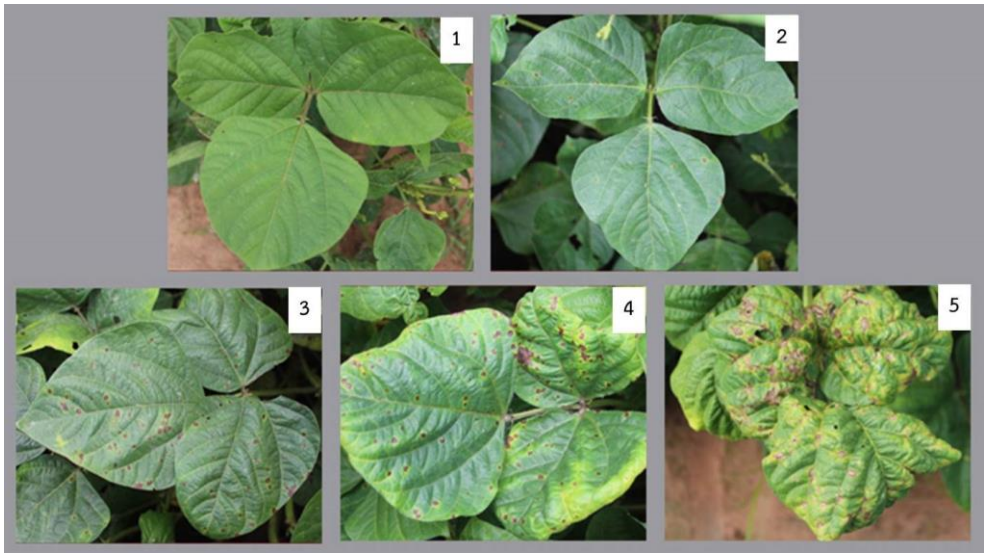

Figure A.15 Scoring criteria for assessing Cercospora leaf spot symptoms in mungbean.