

Salicylic acid induces plant systemic resistance to against anthracnose in coffee

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Introduction

Anthraco-nose is a major disease which has severe impact on coffee yield and quality. The outbreak of Anthracnose usually started during coffee flowering and fruit bearing stage[1], so the early stage of coffee production is a crucial time point to prevent the disease. Salicylic acid (SA) is a signaling molecule in plants which can induce SAR pathway and against pathogens[2]. The purpose of this study is to induce the systemic disease resistance of coffee trees at the early stages, so as to increase the effect of preventing and controlling coffee anthracnose in the field.

Materials/Methods

The experiment was conducted on two coffee estate in Southern Taiwan. Tested varieties were *Coffea arabica* L. SL34 and Gesha, which are the two major varieties in Taiwan. Farmers often use Azoxystrobin before and after raining season to prevent the outbreak of anthracnose, we introduce SA into conventional fungicide practice and test the effect of SA to control anthracnose (*Colletotrichum* spp.) in the field. We evaluated the Infection Rate on leaf and fruit by calculated the infected leaves, branches and fruits. The treatment group used 100 mg/L SA, foliar spray, during the flowering stage and fruit developing stage; Trees without SA as the control group. Field Trial A was conducted at altitude 1450 m with 5 year-old SL34 planted under 48% of shade and 0% of shade respectively. Therefore we separated the field into two blocks according to the light condition. Field Trial B was conducted at altitude 1200 m with 3 year-old Gesha planted under 0% of shade. Both experiments were investigated in 2020.

Table 1: Effect of SA treatment on the percentage of infected leaves of SL34 and Gesha coffee trees.

Total Infection Rate on Leaf (%)		Treatment	
Variety	Shade (%)	CK	SA
SL34	48	5.00	1.30
	0	10.83	4.40
Gesha	0	49.10	16.00

Table 2: Effect of SA treatment on the percentage of infected fruits of SL34 coffee trees.

Infection Rate on fruit (%)		Treatment	
Month	Shade (%)	CK	SA
Jun.	48	7.59	4.19
	0	5.13	3.05
Aug.	48	7.50	5.97
	0	11.53	4.66

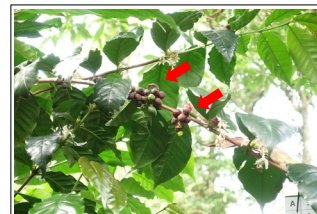
Conclusion/Perspectives

Use of SA with fungicide at the early stages of coffee production can reduce the severity of Anthracnose infection, especially in open sun condition. We think it is a promising way to improve plant disease resistance without affecting conventional agricultural practice.

References:

- [1] Batista et al., Front. Plant Sci., 2017, DIO: 10.3389/fpls.2016.02051
- [2] Vlot et al., Annu. Rev. Phytopathol, 2009, DIO:10.1146/annurev.phyto.050908.135202

Infected



Not Infected



Figure 1: Symptoms of coffee anthracnose on SL34 berries.

Results/Discussion

In Field Trial A, SL34 planted under shade condition with SA treatment had 1.30% of Total Infection Rate on leaf, and 5.00% without SA; In open sun condition, SA treated group had 4.40 % of Total Infection Rate on leaf, and 10.83% without SA. In Field Trial B, Gesha trees with SA treatment had the Total Infection

Rate of 16%, and 49.1% without SA. Both experiments in open sun condition had significant effect of reducing infection rate when treated with SA. We also investigated the severity of fruit on SL34. Under shade condition, trees treated with SA had 5.97% of Infection Rate on fruit, and 7.5% without SA; 4.66% with SA, and 11.53% without SA in open sun condition.