

Influence of water pH and time of mixing on the efficacy of fludioxonil and isofetamid, the main components of the fungicides Switch 62.5WG and Kenja 400 SC, against *Botrytis cinerea*

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Summary

It is known that water pH can interfere with the stability of some chemical products, such as insecticides, herbicides, and fungicides. However, the influence of different water pHs for most fungicides is not known. The present study evaluated the stability of fludioxonil and isofetamid mixed in water pHs varying from 5 to 9 and applied 1 to 24 hours (h) after mixing. Water pH did not negatively affect the efficacy of fludioxonil and isofetamid *in vitro*. However, the time of fungicide mixing affected the activity of isofetamid, and it may play an important role in the efficacy of fungicides used for *Botrytis* fruit rot control.

Methods

Objective. To evaluate the effect of water pH and intervals between mixing and spraying on the effectiveness of fludioxonil (active ingredient in Switch 62.5WG and Miravis Prime) and isofetamid (active ingredient in Kenja 400SC) against *Botrytis cinerea*

Two isolates of *B. cinerea*, previously characterized as sensitive to fludioxonil and isofetamid, were grown on HA medium for about 14 days. The *in vitro* spiral plate method was used to test both fludioxonil (FRAC 12) and isofetamid (FRAC 7) mixed in well-water as well as water adjusted to three different pH levels (5, 7, or 9). Treatments were applied 1, 4, 12, or 24 h after mixing on Potato dextrose agar (PDA) medium. Each isolate of *B. cinerea* was transferred to the plates, and the EC₅₀ (concentration to inhibit 50% of

mycelial growth) was obtained for each isolate and time x pH treatment combinations. Well water was used for comparison and obtained from the same source used for tractor sprays at GCREC. pH was measured at the time of collection, before autoclaving, after autoclaving, and 5 days later, respectively.

Results

Objective

The well water had a pH of 6.63 at collection. pH was 6.71 after autoclaving and 6.80 5 days later. Results obtained from *in vitro* assays showed no significant influence of pH levels tested (well-water ~6.7, and water adjusted to 5, 7, and 9) on the efficacy of fludioxonil or isofetamid against *B. cinerea in vitro*. The time factor represented by the intervals between mixing and application (1, 4, 12, and 24 h) did not impact the efficacy of fludioxonil. However, for isofetamid, reduced efficacy was observed with increased time intervals (Table 1 and 2).

Table 1. Efficacy of **fludioxonil** and the influence of water pH and time between mixing and application on controlling botrytis fruit rot of strawberry.

Time	water pH	EC ₅₀	
		11-45	11-67
1	well water	0.036	0.028
4	well water	0.033	0.027
12	well water	0.028	0.026
24	well water	0.032	0.032
1	5	0.037	0.026

4	5	0.031	0.024
12	5	0.031	0.025
24	5	0.034	0.029
1	7	0.031	0.024
4	7	0.033	0.028
12	7	0.032	0.023
24	7	0.032	0.027
1	9	0.036	0.027
4	9	0.035	0.024
12	9	0.032	0.026
24	9	0.033	0.028
Pr>F		0.18	0.14

Pr>F greater than 0.05 indicates that the respective factor does not influence the product efficacy on controlling mycelial growth *in vitro*.

Table 2. Efficacy of **isofetamid** and the influence of water pH and time between mixing and application on controlling botrytis fruit rot of strawberry.

Time	water pH	EC ₅₀	
		11-45	11-67
1	well water	0.174	0.221
4	well water	0.219	0.305
12	well water	0.266	0.359
24	well water	0.341	0.385
1	5	0.182	0.208
4	5	0.222	0.304
12	5	0.270	0.345
24	5	0.281	0.467
1	7	0.154	0.219
4	7	0.239	0.268
12	7	0.259	0.373
24	7	0.289	0.423
1	9	0.163	0.210
4	9	0.199	0.272
12	9	0.238	0.285
24	9	0.293	0.456
Pr>F		<0.0001	<0.0001

Pr>F greater than 0.05 indicates the respective factor does not influence the product efficacy on controlling mycelial growth *in vitro*.

Takeaways

Our results indicate that while pH had no significant interactions with efficacy of fludioxonil and isofetamid, the time interval between mixing and application might be an important factor affecting the efficacy of fungicides against Botrytis fruit rot of strawberry. While in our assays fludioxonil

maintained its efficacy up to the highest tested interval (24 h), isofetamid had lower efficacy with increased time. Therefore, given the range of products available on the market and the absence of time x pH assays for each, it is recommended that fungicides be applied soon after mixing to prevent loss of efficacy.

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