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Summary of I.F.R. - Report No. 1440

THE EFFECT OF PYRIDYLMERCURIC ACETATE FROM TWO SOURCES ON BROOK AND RAINBOW TROUT

By

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The use of pyridylmercuric acetate (PMA) for treatment of various external diseases of fish has given excellent results in the past several years. It has been especially effective in controlling gill disease among trout in Michigan fish hatcheries. According to experience in Michigan and at hatcheries in other states, PMA can be used safely at a dilution of 1:250,000 in treating brook trout, but must be diluted further to 1:500,000 for use on rainbow trout and then used with great care to prevent a mortality of fish. Therefore due precautions are exercised when treating rainbow trout with PMA in our hatcheries to prevent mortality. In spite of the precautions, two incidents occurred in which a high mortality among rainbow trout followed treatment with PMA. The fact that PMA from two sources was involved led to the tests described here.

The first incident occurred at Oden hatchery where the raceways are constructed in two parallel series. Water from pond 15 flows successively through ponds 17, 19, 21 and 23, and water from pond 16 flows successively through ponds 18, 20, 22 and 24. On October 11, 1954, brook trout in ponds 15 and 16 were treated with PMA and the treated water was flushed through the lower ponds as usual. The stock solution for one pond was made with PMA from Mann Fine Chemical Company, New York, New York. The stock solution for the other pond was made from a mixture of PMA from Mann's and

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from the Mallinckrodt Chemical Works, St. Louis, Missouri, because the supply from Mann's was exhausted. The three ponds below 15 and 16 contained brook trout and the fourth ponds below 15 and 16, i.e., 23 and 24 respectively, held legal-sized rainbow trout. On the afternoon following the treatment, and the next day, there was a loss of 551 of the 8,000 fish in pond 24, but no loss above normal in pond 23. Brook trout were not affected. Since fish were killed in one series of raceways and not the other, there were two possible causes, either there had been an error in making the stock solution for treating one pond or the PMA from one of the sources was at fault. Record was not kept as to which pond received the mixture.

There was not enough PMA on hand from Mann's to run further tests, but the PMA from Mallinckrodt was tested at the pathologist's laboratory in Grayling on fingerling rainbow trout at a dilution of 1:500,000 for one hour. The test fish were held for one-half hour after the treatment, then released to the hatchery ponds because there were no facilities at that time for holding the fish any longer. No mortality resulted during the test so it was assumed that the stock solution had been too strong when the fish were treated at Oden.

The second incident happened at Harrietta hatchery when rainbow trout fry were given the usual prophylactic treatment with PMA. Several hours later a mortality began and it extended throughout the following day, resulting in a loss of about 600,000 fry. The PMA used was from the Mallinckrodt Chemical Works. The hatchery superintendent, Mr. Southwick, had some PMA from Mann Fine Chemical on hand. On the day following mortality he treated one trough on rainbow trout fry with PMA from Mallinckrodt and one trough with PMA from Mann's. Those treated with Mallinckrodt

chemical died but those treated with Mann chemical remained normal. Rainbow trout fry and a supply of PMA from each source were brought to the aquarium in Grayling for testing. The following tests were made:

Rainbow trout fry from Harrietta:

1. 20 fry. Mallinckrodt PMA from Harrietta. 1:500,000 for 1 hour.
   Post treatment 1 hour. Some fish at surface. None dead.
   " " 4 hours. 16 dead fry.
   " " 16 hours. All fry dead.
2. 20 fry. Mann Fine PMA from Harrietta. 1:500,000 for 1 hour.
   None died in 16 hours.
3. 20 fry. Mallinckrodt PMA from Pathologist's stock at Grayling.
   1:500,000 for 1 hour.
   Post treatment, 3-1/2 hours. Many fry at surface, some very weak.
   " " 5-1/2 hours. 7 dead. Others weak.
   " " 20-1/2 hours. All dead.
4. Repeat of 2. Results same.
5. 10 fry. Mallinckrodt PMA from Pathologist's stock at Grayling.
   1:1,000,000 for 1 hour.
   Post treatment 17 hours, 6 dead.

Rainbow trout fingerlings from Grayling:

1. Four fish. 5.6", 5.8", 5.0", 4.7". Mallinckrodt PMA from Pathologist's stock. 1:500,000 for 1 hour.

   Post treatment 2-1/2 hours. 2 fish in poor condition.

   " " 6-1/2 hours. 2 fish dead.

   " " 21-1/2 hours. 3 fish dead. One remained alive.

2. Four fish. 4.4", 4.8", 5.6", 5.8". Mann PMA from Harrietta. 1:500,000 for 1 hour.

   None died in 21-1/2 hours.

3. Repeat of 1. Results same.

4. Four fish. Same as 1, except treated 1/2 hour. All fish died in 20 hours.

Brook trout fry from Oden:

1. 20 fry. Mallinckrodt PMA from Pathologist's stock. 1:500,000 for 1 hour.

   None died in 20 hours.

2. 20 fry. Same chemical as 1. 1:350,000 for 1 hour.

   None died in 20 hours.

3 & 4. 20 fry each. Mann PMA. 1:350,000 for 1 hour.

   No fish died.

5. 10 fry. Mallinckrodt PMA from Harrietta. 1:350,000 for 1 hour.

   No fish died.

6. 10 fry. Mallinckrodt PMA from Pathologist's stock. 1:250,000 for 1 hour.

   No fish died.

Brook trout fingerling from Grayling:

1. Four fish. 4.0", 4.8", 5.0", 5.6". Mallinckrodt PMA from Pathologist's stock. 1:350,000 for 1 hour.
   No fish died in 21-1/2 hours.
2. Four fish. 5.2", 5.6", 6.2", 6.4". Mallinckrodt PMA from Pathologist's stock. 1:250,000 for 1 hour.
   No fish died in 21-1/2 hours.

As was demonstrated in the above tests, PMA from the Mallinckrodt Chemical Works is lethal to rainbow trout in dilutions as high as 1:1,000,000, whereas the chemical from Mann Fine Chemical Company was not lethal in the recommended dilution of 1:500,000. In all probability the mortality at Oden hatchery was caused by the PMA used and not by an error in making stock solution. Brook trout fry or fingerlings were not adversely affected by PMA from either company.

It is recommended that PMA from the Mallinckrodt Chemical Works be used only on brook trout and not for treatment of rainbow trout under any circumstances. Also, precautions must be taken to prevent any of the water used in treating brook trout from entering ponds containing rainbow trout.

<u>These recommendations should be strictly adhered to until further information is available</u>. A sample of PMA from each source has been sent to the Mallinckrodt Chemical Works for analysis. A reply has not been received at this date.

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