

February, 1992 (Compiled by Shelley Sparhawk)

The Pollination Ecology of Mimulus nanus Study:

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Sharon began her study in 5/87. The study is part of her PhD program at Idaho State University. Her permit just said that specimens and data must be made available to the public. Field work was completed in 1989, however she isn't making much progress on lab/greenhouse work and a final thesis. For the 1990 and 1991 annual report, she submitted the same report saying she was 95% done and would finish that year... but she still isn't finished.

I spoke with her in January, 1991:

She has an estimated 150 insect specimens. She is still analyzing them and intends to send them to us when she is finished.

Four voucher specimens are at the USDA Bee Lab at Utah State University in Logan, UT. They want to keep them.

She will also send copies of field notes, abstracts for 2 presentations and a copy of the paper mentioned in the 1990 annual report.

She says when she got the permit she was not told her she would have to submit everything to CRMO and she's a little upset about it, but says she will comply when the project is completed.

ACTION NEEDED:

Determine if CRMO has the facilities for storage of the specimens. If not, try to get the cabinets needed.

Continue to contact Sharon periodically just to let her know we didn't forget and to see if she's making any progress toward finishing.

Contact the USDA Bee Lab directly and try to work out something... permanent loan or at least copies of their records for insects collected at CRMO, so we know what they have at least.

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

INVESTIGATOR'S ANNUAL REPORT

To be completed by the researcher and returned to the Superintendent

NRSP Number	Park	Region	Year
RMP Proj. Number	Craters of the Moon		1990

1a. Project Title THE POLLINATION ECOLOGY OF MIMULUS NANUS

1b. Project Objectives see attached sheet

2. Name(s), Institution, mailing address and telephone number of principal researchers during calendar year (CY). Sharon Walsh Idaho State University 1524 34th Circle S. E. Rio Rancho, NM 87124 505 891-1710	3. Estimated funding amount(s) expended (including personnel time) during CY: Enter \$ (in thousands) and agency/organization name for each source. a. NPS \$ 0 / b. Other Fed Agency \$ 0 / c. State/Local Agency \$ 0 / d. Academic Instit. \$ 0 / e. Non-profit Instit. \$ 0 / f. Personal/Volunteer \$ 0 / 4. Project start date(mo/yr): 5/87 5. Expected end date (mo/yr): 8/91 6. Percent completion of project to date: 95%
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7. Summary: Please address each of the following, where applicable; (a) progress, (b) significant findings, (c) reports/publications during calendar year, (d) status of any specimens collected, and (e) plans for next year. (Use back of sheet if necessary)
see attached sheet

8a. Keywords (Enter up to 4 keywords from standard list)
pollination, reproduction, genetics, seeds

8b. Name of species (or Genus) studied (entered up to 2 names)
Mimulus nanus

Name of Family or Order studied: Scrophulariaceae

The objectives of this study were: 1) to determine the natural history of M nanus, 2) to determine the pollinators, their densities, and their foraging behavior, and 3) to determine the genetic relatedness of 2 populations. The work for objective #3 was performed in spring 1989 and completed during the summer of 1989.

The data we collected will be used to continue our genetic studies of the 2 populations of Mimulus nanus at Craters of the Moon National Monument and Ketchum, Idaho. These results are preliminary and will be used to collect more concrete data which we will use for determining genetic relatedness of the 2 populations.

The portion of the study utilizing electrophoresis functioned as a survey to determine which enzyme systems were best suited for this species. We assayed 11 loci and found that 3 of these loci were monomorphic and 8 were polymorphic. Because monomorphic loci cannot be used for genetic studies, the 3 monomorphic loci, triose-phosphate isomerase (TPI), glucose-6-phosphate dehydrogenase (G6PDH), and malate dehydrogenase (MDH), will not be used for any additional electrophoretic studies. The polymorphic loci were acid phosphatase (ACP), aldolase (ALD), aspartate aminotransferase (AAT), glutamate dehydrogenase (GDH), menadione reductase (MNR), phosphoglucose isomerase (PGI), and phosphoglucomutase (PGM). The gel-electrode buffer systems we used were: 1) Citrate-Histidine, pH 7.0 using 0.400 M citric acid, pH 7.0 for the electrode buffer and 0.005 M histidine-HCl, pH 7.0 for the gel buffer; 2) TRIS-Citric Acid, pH 7.5 using 0.223 M TRIS and 0.086 M citric acid, pH 7.5 for the electrode buffer and 0.008 M TRIS and 0.003 M citric acid, pH 7.5 for the gel buffer; and 3) Morpholine-Citrate, pH 6.1 using 0.04 M citric acid and 0.068 M N-morpholine for the electrode buffer and diluting this 1:20 for the gel buffer.

The 8 polymorphic loci will be used to refine our techniques and to gather solid evidence of the genetic similarity or dissimilarity of the 2 populations.

The results for objectives have been reported at a national meeting and 1 state meeting. A paper titled, COMPARISONS OF THE INSECT POLLINATORS IN 2 POPULATIONS OF MIMULUS NANUS (SCROPHULARIACEAE), was presented at the 1989 Idaho Academy of Science Meeting and one titled, THE EFFECTS OF RESOURCE ENHANCEMENT ON THE ABORTION RATES IN 2 POPULATIONS OF THE ANNUAL PLANT, MIMULUS NANUS, was presented at the 1989 Annual Meeting of the Ecological Society of America. Additionally, a paper has been published in the Entomological News 101:67-69, 1990, titled, COLLECTIONS OF DUFOUREA VERSATILIS (HYMENOPTERA:HALICTIDAE) FROM IDAHO.

FROM 1989 IAR

This project, with data collected in 1987 and 1988, is almost completed. It has 3 main parts: 1) an investigation of the pollinators of Mimulus nanus, 2) an analysis of abiotic and biotic effects on fruit and seed production, and 3) an electrophoretic study to determine genetic relationships. All data has been collected and data analyses are finished except for the electrophoretic data.

For the first part of the study, from the 2 study areas (one at Craters of the Moon National Monument and the other near Ketchum, Idaho), I collected 53 species of insects, representing orders hymenoptera, diptera, lepidoptera, hemiptera, homoptera, and coleoptera. 80% of these insects were bees and wasps, 12% flies, and 8% from the other 4 orders. The bees were from families halictidae, megachilidae, apidae, and anthophoridae and the wasps were from families vespidae, chalcididae, and sphecidae. In 1987 the collected insects from the Craters site represented 43% of all collected insects compared with 57% from the Ketchum site. In 1988 only 17% of the total insects collected was from Craters. In neither 1987 nor 1988 did species diversity differ between areas. Also, in both years fewer males and females were collected at the Craters site. Although 23 species of insects were collected at each site, only 8 were found at both sites. Thus, both the species abundance and species composition varied between the 2 study areas.

Seed production varied greatly between the 2 study sites during the 2 years of data collection. The Craters site had consistently lower seed production than the Ketchum site: in 1987 an average of 445 total seeds/plant was produced at Craters versus 695 at Ketchum; in 1988 the Craters site produced an average of only 57 total seeds/plant versus 302 at the Ketchum site. However, fruit production did not differ between sites and decreased dramatically within the same site but between years at the Craters site. Only an average of 5 fruits/plant was produced in 1988 compared with 21 in 1987. Additionally, seed weight differed between sites for a given year but was constant from year to year in each site. The average seed weight at Craters was 0.037 mg, but was only 0.028 mg at the Ketchum site.

One publication has been accepted for publication at this date titled, COLLECTIONS OF DUFOUREA VERSATILIS FROM IDAHO. It will be published in early 1990 in Entomological News.

Specimens of collected insects are housed at the U. S. D. A. Bee Laboratory at Utah State University in Logan, Utah.

No further field work will be needed for this project which will be completed in full in early 1990.