REPORT FROM THE FIELD

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By
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This year is quite unique. In most years, we can make a pretty good prediction of how the coming wildflower season is going to be by this time. Of course, Mother Nature can still throw us a curve. Like in the year 2004 when there were comparable number of young poppy plants to the previous year which had had an outstanding wildflower season but then the latter half of March was unseasonably warm and the soil dried, most of the young poppy plants died and the remaining surviving plants had stunted growth with only one to three open blossoms at any time whereas the previous year there were ten to twenty open blossoms. The 2004 season was over. Last year was another surprise. There was a good crop, actually a record crop, of poppy plants developing normally and I expected the season to be much better than the previous few years and, suddenly, the season was over, done, gone by mid-March even though the temperatures were warm but not excessive. This year it seems Mother Nature is playing her own version of "Mother May I" starting all the way back in the middle of July when a summer thunderstorm deposited 1 1/4 inches of rain at the Reserve triggering germination of, at least, filaree seeds, wild oats, and, most likely, poppy and other species seeds as well. Some of the germinated filaree and wild oats survived the harsh summer without any additional rains evidenced by finding open filaree blossoms and seed heads on the wild oats at the end of October; too soon to have come after the mid-October seed germinating rainstorm. Although we didn't find any open poppy blossoms at the end of October/ early November, we did also find a few unexpectedly mature poppy plants so they also probably survived from the summer thunderstorm. A moderate amount of seed germination did occur following the mid-October storm; approximately 30 poppy plants per m2. Although there were five minor rainstorms between the mid-October storm and the next significant storm in early January, apparently they weren't enough to keep the young poppy plants alive and we observed a high mortality of the young plants; only 10 to 15 percent of the plants survived by late January. It's almost like the season had to go back to the beginning and start over. The researchers didn't have much luck finding newly germinated poppies among the growing filaree and grasses following the last significant, end-of-January rainstorm. Without new, replacing seed germination, it's not going to be much of a poppy display season this spring. Without the much expected El'Nino rainy season, the Reserve has only received less than 6 1/2 inches of rainfall since 1 Sept of last year, almost exactly the same as last year at the same time, so it could be another short season as well.

In my first recent "Report from the Field" (RFF), I described one of two recent experiences where our field research results were shared with outside organizations and said that I would cover the second experience in the next report. It turned out that I simply reported on our early winter field observations of what was happening at the Poppy Reserve in the second RFF and put off covering the second experience to a later report and that time has come.

The first experience was very positive in that the recipient of the email immediately replied and thanked us for the information; even confirming our findings with a professional botanist who has done field research on the California poppy in the past. The recipient even encouraged us to publish our findings

so she could use them to update the USDA Plant Database's description of the California poppy. The USDA Plant Database requires citing published sources for their information. The second experience was not so positive in that the recipient of our contact email never even acknowledged the email. Never the less, we stand by our findings and still believe our findings are valuable input to her work.

Last fall, the US Federal Government announced an important, even exciting, policy change. In the past, the Federal Government used readily available seeds of non-native plant species to reseed natural burnt areas following forest or bush fires but, in the future, they will only use seeds of native plants for reseeding. Using non-native seeds for reseeding burnt areas has allowed the establishment of non-native plant communities which changes the entire future ecology of the burnt areas and they might never recover to the healthy native ecology being maintained prior to the fire. The old policy certainly contributed to the serious problem of the spreading of invasive plants and their subsequent impact on an area's entire ecology. Therefore, the new policy of using only native plant seeds is a major improvement but our field observations indicate that there are a number of issues that must be considered if the new policy is going to be successful. This report will describe our findings and how they might affect the new policy.

You might be asking the question "How can reseeding with non-native seeds affect the entire future ecology of the burnt area?" Before going into the details of our field research findings and their potential impact on the new reseeding policy, let's, at least, partially address this question. Densely sowing non-native seeds certainly changes the competitive dynamics between native and non-native seeds and their germination success. If the non-native seeds germinate quicker or in drier soil conditions than the native seeds, they start drawing moisture and minerals from the soil having the potential to negatively affect the germination yields of the later germinating native seeds. It is well documented that densely growing non-native grasses have significantly increased the frequency and intensity of recent forest and bush fires. The higher soil temperatures resulting from the more intense fires can damage, or destroy, the soil's native seed bank because native seeds are not typically adapted to intense fires. The elimination of native seeds allows the establishment of fully non-native plant communities. Changing plant communities can also impact the grazer populations feeding on the plants. Certain grazing species prefer forb plants as food stock and others prefer grasses. A changing plant community can therefore change the type of grazer populations or the density of grazers that can be supported. Any change in the grazer population then subsequently changes the predators that feed on the grazers. It is not only the larger animals that can be impacted. Different species of butterflies feed, and lay eggs, on specific species of plants so they can be impacted as well. Birds, insects and even ants which feed on seeds can also be impacted by changes in the plant community. This is also true for pollinators that are adapted to specific plant species and this leads to the concerns about implementing the new policy. These few examples show how a simple change in the plant community can ripple through the entire ecosystem of an area.

The results of thirteen years of the Poppy Reserve's volunteer researchers' field observations highlight several issues that could complicate the Federal Government's new policy of using only seeds of native plants to restore burnt areas following forest and bush fires. The first issue concerns their plan of partnering with commercial seed growers to provide the needed native seeds. The following is based

mostly on speculations because commercial seed growers' procedures have not investigated but we believe that it is still a valid concern that needs to be considered. If commercial seed growers' procedures are similar to other commercial farming, they sow their seeds and begin a selected watering schedule; most likely to yield the maximum seed quantity. How can this be bad? Seeds of commercially grown native plant species are likely not representative of the genetic variability of natural seed populations. The field observations have shown a consistent, predictive correlation between the rainfall amount of individual rain storms with the amount of subsequent seed germination. At the Reserve, no poppy seed germination following storms depositing less than approximately 0.5 to 0.6 inches of rainfall has been observed. For rainfalls above this limiting value, the amount of seed germination initially increases with increasing rainfall amounts. Maximum seed germination occurs for rainfalls between 1 and 2 inches. For rainfalls above 2 inches, the amount of poppy seed germination begins to decrease with increasing rainfall amounts. Again, no poppy seed germination occurs for storms having rainfalls above 4 to 6 inches. Although there is no genetic data to confirm our hypothesis, we believe the observed pattern results because natural seed populations have a distribution in soil moisture conditions required to trigger germination. It is very unlikely that commercially grown seeds of annual plant species will have this same genetic variability. If commercial seed providers use a fixed watering schedule, only seeds adapted to the selected watering schedule will germinate and, because the grower is likely to use a portion of each year's seed crop to reseed their fields for the next year, within a few years, all the plants resulting from seed germination will only be producing seeds adapted to a narrow range of soil moisture conditions. For natural populations, having seeds that germinate over a wide range of soil moisture conditions is likely to be a great benefit for maintaining that population. To have the greatest probability of successfully restoring a burnt area, each species in the selected native seed mixture should consist of seeds grown under a range of watering schedules to better simulate a natural population. If the commercial seed providers use a watering schedule resulting in maximum seed yields, this might even require subsidizing growers to grow plants under lower yield, non-optimum watering schedules.

The second aspect of our observations that might have applicability to the Government's new policy is the importance of using seeds from plants exposed to the same pollinators found in the targeted restoration area. A published paper by South African researchers, who studied approximately 2000 different species of African grassland wildflowers, stated that essentially all of the different studied species had only one or two effective pollinator species even though other animal species might visit the blossoms to collect food and that even different plant species having a common pollinator had evolved common reproductive organ characteristics. If true, plants grown from seeds collected from commercial plants grown in an area with different pollinators are likely to have non-optimum locally adapted reproductive organ characteristics that could result in degraded pollination effectiveness when used in the restoration area; jeopardizing the success of the restoration effort. Now living in Long Beach, I have personally observed significant differences in the reproductive organ configurations between poppy plants at the Reserve compared to wild poppy plants growing in the Long Beach area as well as significant differences in the animals observed visiting poppy blossoms in the two different areas. Poppy blossoms on plants growing in Long Beach typically have relatively short stigma, the blossom structure that transfers particles of pollen containing the plant's sperm to the blossom's ovary where the contained eggs are fertilized creating seeds. These short stigma grow directly away from the poppy blossom's ovary, located at the base

of the blossom, whereas the poppy blossoms at the Reserve have significantly longer stigma that initially similarly grow away from the ovary but then turn and grow radially outward towards the open blossom petals. The only animal species seen visiting the Long Beach poppy blossoms has been a small native bee whereas many fewer native bees are observed visiting the Reserve's poppy blossoms but these blossoms typically have numerous small beetles and other insects species visiting the blossoms giving evidence that dispersed local populations of even the same species of plants undergo local adaptation to the available possible pollinators.

These two examples show how even local field observations can have applicability to broader policy issues.

Hopefully, Mother Nature will still reward us with the breathe-taking beauty of our spring wildflower displays that we so love and look forward to. The next “Report from the Field” will be after the spring season so we’ll dissect what eventually actually happened. Until then, enjoy your visits to the Poppy Reserve.