REPORT FROM THE FIELD

By

Michael Powell

Although a number of locations in California reported what is now colloquially called a “super bloom” for this past spring wildflower season, the Poppy Reserve was rather surprisingly not one of them. Even with a few smallish areas of good poppy color, especially on the east ridge, the Reserve’s overall poppy displays this spring would have to be considered disappointing modest, at best. With the Reserve’s winter/spring total rainfall being the third highest in the last twenty-six years, outstanding poppy color was certainly expected which raises the question “What happened?” This article will discuss one possible answer, selective survival of plant species, to this question in detail and will touch on a second possible answer, lack of appropriate rainstorms, briefly to evaluate this possible alternative.

Although data needed to definitively answer this question is not available, limited field observations do give several reasonably plausible explanations. The first theory starts in early September 2022 when the Reserve saw its first, atypically early seasonal rainstorm; see Figure 1. The Poppy Reserve volunteer field researchers set the start of each year’s poppy season, which culminates in the spring wildflower displays, at the first fall/winter rainstorm depositing more than ½ inch of rainfall. From many years of field observations, poppy seed germination, at least at the Poppy Reserve, doesn’t occur following rainstorms depositing less than ½ inch of rain. Although it is relatively rare, the wildflower season has started in four prior Septembers; 1997 - 25 Sept, 1998 - 4 Sept, 2005 - 20 Sept, 2011 - 14 Sept, and now 2022 - 11Sept. Based on past observations, a moderate amount of poppy seed germination would be expected from the 0.8 inches of rainfall deposited during the September rainstorm.

2022 **2023**

FIGURE 1: POPPY RESERVE 2022/2023 SEASONAL RAINFALL

When the permanent monitoring plots located at various locations across the Reserve were inventoried in mid-November no young poppy plants were found. This was disappointing but not unexpected. Again, based on past observations, small, just germinated poppy plants can survive for three or four weeks without any measurable additional watering with little plant mortality. For periods longer than this, poppy plant mortality becomes significant. When the next significant rainstorm didn’t occur until the end of the first week in November, the eight weeks between rainstorms was too long and the poppy plants that had germinated following the September rainstorm had all died off and the season had to start over. The warm temperatures that had occurred in September after that first rainstorm and throughout October probably aggravated the plant mortality by increasing soil moisture evaporation. General observations taken in different areas of the Reserve confirmed the monitoring plot findings. The generation of early season poppy plants had almost completely been lost.

The only exception to this was observed along the lower edge of a section of the new, paved ADA trail. Here a few mature poppy plants were observed during the November visit, see Figure 2. This is contributed to the increased rain runoff from the impervious path giving just enough additional soil moisture for the poppy plants to survive. These more mature plants help substantiate that poppy seeds did actually germinate following the September rainstorm. The first observed poppy blossom of the season was found on one of these plants, see Figure 3, on Christmas Day; several months earlier than the later germinated poppy plants started to blossom.

FIGURE 2: POPPY PLANT LOCATED ALONG EDGE OF THE ADA TRAIL

FIGURE 3: DECEMBER 25 '22 FIRST POPPY BLOSSOM

Although last season's first poppy generation did not survive the long period without measurable rainfall, it is a different story for the filaree and fiddleneck plants that also germinated following that same September rainstorm. Apparently, these plant species can survive in drier soil conditions than the poppies. During the mid-November visits to the Reserve, a moderate number of mature filaree plants and a large number of mature fiddleneck plants were observed throughout the western half of the Reserve but far fewer along the east ridge trails. Typically, rainstorms deposit slightly less rainfall on the eastern half of the Reserve than the western half. This could account for why fewer filaree and fiddleneck plants survived in this region of the Reserve. By mid-November, a few of the mature filaree plants had already blossomed and started to set fruit, see Figure 4.

FIGURE 4: MATURE FILAREE PLANT WITH BLOSSOM BUDS AND FRUIT

Having provided background on how the early portion of last season unfolded, a possible explanation for the poor spring poppy displays is that these widespread, mature filaree and fiddleneck plants with their fully developed root systems, represented a significant challenge to the young poppy plants that resulted from later cycles of poppy seed germination following subsequent rainstorms. This situation of selective survival among the Reserve's competing plant species seems quite atypical. At least, in twenty years of Poppy Reserve field observations, last season was the first time it was specifically noted.

A general rule of thumb is that a plant's root system covers an equivalent area as the above ground foliage. If this holds true for filaree and fiddleneck plants, the soil would be largely filled with the surviving plants' networks of roots drawing both moisture and nutrients from the soil. It seems plausible that these established root networks would reduce the peak soil moisture levels during subsequent rainstorms and, therefore, reduce the amount of poppy seed germination. It also certainly seems possible that the removal of moisture and nutrients by the filaree's and fiddleneck's established root networks could negatively impact the growth of the young poppy plants that do result from the reduced seed germination. The three red "**X**s" shown in Figure 4 mark three, just emerged poppy cotyledons resulting from poppy seed germination that occurred following the 7/8 November rainstorm. It certainly appears that these small plants are in an unfair battle with the more mature surviving filaree and fiddleneck plants, as well as all the young plants that co-germinated from the November rainstorm, for the available soil moisture and nutrients. If these possibilities are true, this spring's observed selective survival of plant species from the early season rainstorm could result in a reduction of both the number and size of the poppy plants eventual mature size and, therefore, the quality of the spring poppy displays by reducing the number of open poppy blossoms.

Whereas total seasonal rainfall has an indirect influence on the quality of a spring poppy season by impacting the length of the season and the ultimately achieved size of the poppy plants and, hence, the number of open blossoms, the strength of the individual rainstorms have a direct impact on the number of germinated poppy seeds and, i.e. the number of poppy plants and their plant areal density. As discussed earlier in this article, no poppy seed germination is typically seen following rainstorms depositing less than ½ inch of rainfall. The maximum observed poppy seed germination appears to consistently occur following rainstorms depositing between one to one and half inches of rainfall. For stronger rainstorms depositing greater than two inches of rainfall, the amount of seed germination decreases rapidly. If all other conditions are favorable, it typically

requires a single rainstorm in the optimum one to one and half inches of rainfall range to achieve an impressive poppy season.

Late winter's seasonal rainfall pattern shows how unexpectedly unusual this past spring's wildflower season was. Through the elimination of other possible explanations for the spring's modest poppy displays, the data provides indirect support for the hypothesis that the selective species survival was likely a major cause for the modest poppy displays. Figure 5 shows last winter's individual rainstorms amount and timing.

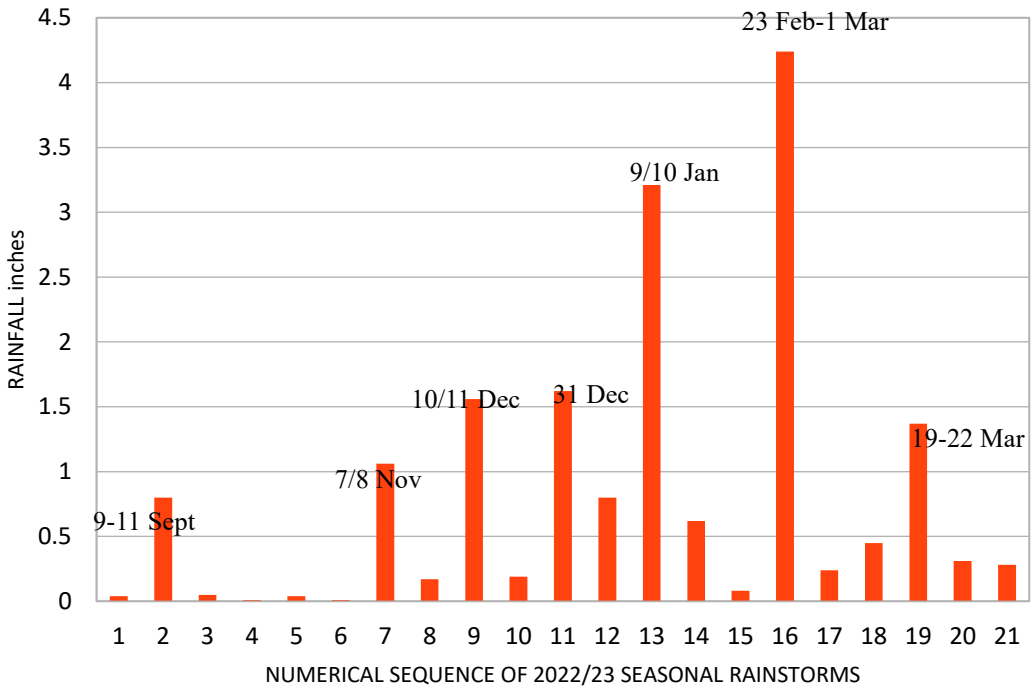

FIGURE 5: 2022/23 INDIVIDUAL RAINSTORMS

As already discussed, the first significant rainstorm occurred from 9 to 11 September 2022 and the second on 7 and 8 November. The four very minor rainstorms that occurred during the eight weeks between these two storms were clearly inadequate to prevent the complete mortality of the poppy plants that germinated following the September rainstorm. It is possible these minor storms did contribute to the survival of the other plant species that did survive. The third significant rainstorm occurred on 10/11 December. It is worth noting that there was four and a half weeks between the November and mid-December rainstorms which could have had some impact on the newly germinated poppy plant survival. It is likely that the cooler air and soil temperatures and the one intervening minor rainstorm during that interval probably limited poppy plant mortality but field observations weren't conducted to confirm this. Field observations taken in mid-December recorded multiple young poppy plants with their first true leaves. Because it was too soon after the 10/11 December rainstorm for the poppy plants that germinated following that storm to have already developed their first true leaves, the