

DISCUSSION

In the study area (Yolo and Solano counties) in the lower Sacramento Valley, the only natural habitat colonized by *Iridomyrmex humilis* is riparian woodland on the valley floor. The absence of this species from chaparral and oak-pine woodland may be partly a function of extreme summer aridity. *Iridomyrmex humilis* has invaded disturbed chaparral, coastal scrub, and other nonriparian habitats in the San Francisco Bay region (Tremper 1976; Ward, unpublished) where the climate is cooler and more humid.

It is not immediately clear what, if anything, prevents *I. humilis* from penetrating foothill riparian woodland in Yolo and Solano counties, along permanently flowing creeks (Putah Creek, Cache Creek), especially since the species occurs in comparable habitat along the Russian River in Mendocino and Sonoma counties (Ward, unpublished). However, upstream dispersal in *I. humilis* may be slow since the species reproduces by colony fission (budding), not by aerial dispersal of queens (Newell and Barber 1913; Skaife 1961). Moreover, unlike the situation along the Russian River, there are no significant concentrations of urban or agricultural land in the western foothills of the lower Sacramento Valley from which introduced inoculi of *I. humilis* might spread.

The present study documents an association between the presence of *I. humilis* in riparian woodland and its occurrence in adjacent agricultural land. Observations suggest that the interchange of populations can occur both ways. Thus, valley riparian woodland harbors populations of *I. humilis*, with the potential of invading adjacent farmland; at the same time, irrigated agricultural land (particularly orchards) may provide source populations which invade nearby natural areas. The latter process appears to have occurred recently at site 21, near Capay, Yolo County.

The preference shown by *I. humilis* for partially disturbed habitats is consistent with observations made elsewhere in the United States (Barber 1916; Smith 1965). In fact, the present study indicates that the ability of *I. humilis* to invade riparian woodland in California and displace native ant species is partly related to the degree of disturbance of the site, in addition to the presence of a permanent water source. However, it is unclear why some far-from-pristine patches of riparian woodland along Putah Creek, Cache Creek, and the Sacramento River remain unoccupied by *I. humilis*. Are the native ants resisting invasion, or is the absence of *I. humilis* from some sites merely a reflection of stochastic aspects of colonization or lack of source populations? This problem could be addressed by experimental manipulation of *I. humilis* populations, and by detailed observations on interactions between native ants and *I. humilis* at the margins of its local distribution.

The displacement of both indigenous and introduced ant species by *I. humilis* has been widely reported (Wheeler 1906; Skaife 1961; Haskins and Haskins 1965; Crowell 1968; Pasfield 1968; Fluker and Beardsley 1970; Lieberburg, Kranz, and Seip 1975; Bond and Slingsby 1984). Erickson (1972) documented the replacement of three native ants, *Pogonomyrmex californicus*, *Pheidole grallipes* (= *vistantus*), and *Messor pergandei*, by *I. humilis* in an old field in southern California. Tremper (1976) found little coexistence between *I. humilis* and other ants in the San Francisco region. *Iridomyrmex humilis* workers have been observed aggressively attacking a variety of native California ants including *Tapinoma sessile*, *Conomyrma bicolor*, *Formica occidua*, *Pogonomyrmex californicus*, *P. subdentatus*, *Messor andrei*, and *Neivamyrmex cal-*