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## WEEDS OF CALIFORNIA AND THEIR RELATION TO WEEDS IN OTHER SECTIONS OF THE COUNTRY

L. H. PAMMEL

The subject of weeds, no matter where they occur, is always of perennial interest. They travel apparently from one end of the country to the other. Sometimes they become permanent and sometimes are only transient. Sometimes they persist for a few years and then disappear; of this *Lactuca scariola* L. and its variety is an illustration.

The author and Miss King <sup>1</sup> recently published a paper, "Some New Weeds of Iowa." In this paper there was given an account of some new arrivals in Iowa. Apparently these same weeds are also new arrivals in Indiana and Prof. Albert A. Hansen, in a letter from Lafayette, Indiana, states: "I was much interested in the contents of the circular because it seems that the recent arrivals in Iowa to the ranks of the weeds are very similar to the new weeds of Indiana," and in his two papers "Recent Indiana Weeds," <sup>2</sup> he lists quite a number of weeds which have become more or less widely distributed from the Atlantic to the Pacific. What therefore becomes a weed problem in one state immediately interest us.

On my several visits to California some attention has been given to the weed problem. In one of my papers, "Notes on the Weeds of California" <sup>3</sup> I gave some of the more common weeds of that state, especially in the San Joaquin and Sacramento valleys. The paper of E. W. Hilgard <sup>4</sup> "The Weeds of California," gives a good account of the naturalized aliens of that state.

Quite recently Prof. S. B. Parish <sup>5</sup> of Berkeley, California, in a most interesting way has brought together the immigrant plants of southern California. This excellent paper gives a long list of plants with some comments on the early introduction of many of these weeds. These alien plants have come to our country in

<sup>1</sup> Circ. Ia. Agr. Exp. Sta., 98: 1-16. 1925.

<sup>2</sup> Proc. Ind. Acad. Sci. 1922: 293, 1.c. 1923: 214.

<sup>3</sup> Proc. Ia. Acad. Sci., 23: 489.

<sup>4</sup> Rep. Agr. Exp. Sta. U. of Calif. 1890: 238. First published in Garden & Forest.

<sup>5</sup> Bull. of the S. Calif. Acad. of Science, 19: Pt. 4. Oct., 1920.

various ways; by early settlers, railways, or, as Prof. Parish says, in regard to California, since the 14th of May 1769 when Father Junipero Serra reached the bay of San Diego these weeds began to appear. They have changed the plant life of California. It was during the mission period that many Mexican and Mediterranean plants were introduced. It was during this period, Prof. Parish states, that such plants as wild oats, bur clover, filaree and wild mustard, tuna or cactus (*Opuntia Ficus-Indica*), were spread by the missionaries. To these we may add such trees as the pepper tree, and olive, grape and smooth tobacco. Some of the introduced plants have become extensively naturalized. Though the opuntia may have spread somewhat and usually occurs near the ruins of some old adobe building or mission, it has not become as widely distributed as many other herbaceous plants.

Such botanists as David Douglas, Thomas Nuttall, and C. C. Parry, as well as the great pathfinder, John C. Fremont who landed in San Diego (Old Town) in 1845, record only a few of the alien plants. It was only after the pioneer period, as stated in 1848 by S. B. Parish, that more aliens were found. The next period began with the completion of the Southern Pacific railway and all the excellent records of Brewer and Watson and C. C. Parry tell us something about these invaders. The later excellent records of many botanists of California, like Cleveland, Orcutt, Jepson, Parish, Hall, Eastwood, Brandegee, Hilgard, Davy, Green, and others, have recorded alien plants.

One of the interesting features of the weed flora of California is the rapid spread of these plants, when they once get a foothold, which is well illustrated by the so-called puncture vine weed, puncture weed or caltrop. In 1899<sup>6</sup> the writer gave an account of this European weed as an introduced plant on Muscatine Island, calling attention to its injuriousness, especially to sheep. It appears that it was first discovered at the Port of Los Angeles in 1903 probably on ballast. It soon spread to the interior valleys and now is a great menace to the automobile because of the spreading habit of the plant, especially because it likes to grow along roadsides where it punctures the tires. It is interesting indeed that this weed should have established itself at such distant points about the same time.

One is also interested to find that the common white sweet clover was found in San Diego county by Cleveland in 1890, and at Los Angeles and San Francisco about the same time, in 1891. It

<sup>6</sup> Bull. Ia. Agr. Exp. Sta., 42: 139. 1899.

was spontaneous in Iowa a little earlier but not at all common. It was during the next 15 or 20 years that it spread over much of the state of Iowa. The common western Iowa weed, the Rocky Mountain bee plant (*Cleome serrulata* Pursh.) is rarely found in California, though so common in the Rocky Mountain country and spreading eastward to central Iowa; but why not in California? The tumbling mustard (*Sisymbrium altissimum*) which has been such a conspicuous weed in Iowa for nearly a quarter of a century did not, according to Prof. Parish, appear in California until 1911.

Another interesting weed not uncommon in California is the Russian thistle (*Salsola Kali* var. *tenuifolia* G. F. W. Meyer) though not uncommon in Iowa since 1892 and now found in all parts of the state, was reported according to Parish, from San Bernardino in 1891 and the Mojave Desert in 1895.

It is interesting to note that common beet (*Beta vulgaris* L) is naturalized in saline soil along the coast, Bay Region and Santa Cruz; also the Australian saltbush (*Atriplex semibaccata* R. Br.) from Australia is common in San Diego.

The common European stinging nettle (*Urtica urens*) of the family *Urticaceae* is common in waste places, pastures and arroyas, as in the Arroyo Del Puerto near Patterson. The wild buckwheat (*Polygonum Convolvulus*) though occurring in the San Joaquin Valley is not common. The sheep sorrel (*Rumex Acetosella* L) is a common weed in more or less sandy soil along the ocean, near San Diego and elsewhere in California, though far less common than in Iowa. The sour dock (*Rumex crispus* L) is a common weed in San Diego, Los Angeles and Patterson.

Several species of pigweed, like *Amaranthus graecizans* L common in the San Joaquin Valley, where the common pigweed (*A. retroflexus* L) is also common. Purslane (*Portulaca oleracea* L) is common in pastures.

The weed problem of California is quite different than in Iowa. The Pacific coast states have received a large number of weeds from the south by way of Mexico, comparatively few from Asia, many from Europe and not a few are indigenous. The list of indigenous weeds for this region is made more formidable than the indigenous weeds of Iowa.

It is interesting to note that some weeds seem to have confined themselves largely to certain climatic areas; thus for instance, the desert where irrigated, soon permits many of the weeds common in other agricultural sections of the country to plant themselves. What Parish calls the Cismontane region between the Sierras and the coast supports certain common types of weeds.

Here again a distinction should be made of an area quite close to the sea and the Coast Range. For instance, throughout this region the following are some of the dominant weeds: radish (*Raphanus sativa* L.) is frequently naturalized along the coast from San Diego to San Francisco. I saw forty and sixty acre fields covered with it in the San Diego region and often common along roadsides and old well drained tideland and marshes. One of the very common mustards in old fields along the sea coast and on roadsides is the rutabaga (*Brassica campestris* L.). It is interesting to note that the



A weedy roadside with *Nicotiana glauca* in foreground near San Diego

black mustard (*Brassica nigra*) is the common mustard in the interior valleys of California like the San Joaquin and Sacramento. It does also occur along the sea coast and Parish tells us it was certainly introduced by the Mission fathers. There are several species of peppergrass (*Lepidium Draba* L., and *L. perfoliatum* L.). They are becoming common in many parts of California. The small peppergrass (*Lepidium apetalum*) or a form of it is common in southern California and like the next mustard blooms all winter. As to our common shepherd's purse (*Capsella Bursa-pastoris* Medic) it is much more common than with us. It is abundant as a winter annual in the interior valleys of California and on the seacoast, blooming all winter in the south. On the seacoast near Santa Cruz the writer saw the common European stock (*Mathiola incana* Br.) abundant in the tideland marshes appearing as a native plant.

The family *Leguminosae* has a number of very common weeds. The most common weeds of this family from San Francisco to San Diego and in the San Joaquin and Sacramento valleys are the bur clover (*Medicago hispida* Gaertn.), and black medick (*Medicago lupulina* L.). The spotted medick (*M. arabica* Huds.) is spreading in the Bay region. The most common weed, however, is the bur clover. The sour clover (*Melilotus Indica*) is not uncommon. It may be noted here that the only common weed of these in Iowa is the black medick while the yellow medick or sour clover is occasionally spontaneous. One is rather surprised to find that the two species of sweet clover (*Melilotus alba* and *M. officinalis*) are not to be counted among the weedy plants of California, though alien. I found occasionally in the southern part of the state and near Patterson, the white sweet clover (*Melilotus alba* Desr.) but did not see the yellow (*M. officinalis* L. Lam.). The species of *Melilotus* (*M. Indica* (L.) All. and *M. alba*) are sometimes grown as cover crops especially the *M. Indica* and consequently these have spread to roadsides and fields. Some other plants are grown as cover crops in orchards, namely the spring vetch (*Vicia sativa* L.), winter vetch (*V. villosa* Roth) and the Windsor or broad bean (*Vicia Faba* L) I found the latter spontaneous in and around San Jose. Some native species of lupine are common in grain fields in the San Joaquin valley: the stout and succulent blue lupine (*Lupinus affinis* Agardhi) which grows in great quantities in barley fields, and the smaller blue flowered and succulent lupine (*L. micranthus*, Dougl.)

Several weeds of the borage family are common. Two of these are spoken of as fire weeds. These are native plants and are common in vacant lots, pastures and grain fields. The *Amsinckia tessellata* Gray, a coarsely hispid annual with yellowish flowers, and the buckthorn, or fire weed (*A. intermedia* F & M) extend to Southern California and frequently bloom all winter in the southern part of the State.

With us in Iowa the velvet leaf (*Abutilon Theophrasti* Medic) is one of the most common weeds, but not so in California. Prof. Parish only gives one locality, Riverside. I did not see it. The same authority reports (*H. Trionum* L.) from the same place. The common mallow (*Malva parviflora* L.) is common not only in the Bay region but also in the Sacramento and San Joaquin valleys to San Diego. It evidently has been naturalized a long time. The ball mallow (*M. borealis* Wall.) is not uncommon in Los Angeles, San Diego and Berkeley. In Iowa the dwarf cheeses (*M. rotun-*

*difolia* L.) is the common weed. It is however more rarely found in California. I observed it in Berkeley near buildings.

Everywhere along the coast and in the interior valleys of California one may see great quantities of the filaree of which there are two species, the *Erodium cicutarium* L'Her, and *E. moschatum* L'Her, plants of the Mediterranean region, which have long been naturalized in that state. These weeds are coming to Iowa from two directions, one from the west coast, because the former plant occurs in Colorado, brought from the southwest; the other from the east. Prof. Parish states that Col. J. C. Fremont found the *E. cicutarium* in the Sacramento Valley in 1844 and that it "covered the ground like a sward." Both of these species are valuable as cover plants in orchards and much relished by stock.

Not related to the above but distinguished by the laity by the name bull filaree, mention may be made of *Phacelia tanacetifolia* Benth. with bluish corollas, somewhat dissected leaves, common in grain fields in the San Joaquin Valley and southward along the coast to Los Angeles.

Several families only have a few weed representatives, like the poppy (*Papaveraceae*); the most common plant is the California poppy (*Eschscholtzia Californica* Cham) with dissected leaves and flowers from deep orange to straw color, common along roadsides and in foothills of mountains and in grain fields. It is abundant from Sacramento to San Joaquin Valley to the Bay region, south to San Diego; blossoms early. Another rather common member of the family in foothill regions and central California valleys is the cream cup (*Platystemon californicus* Benth).

Several members of the carrot family are common; fennel (*Foeniculum vulgare*) is not uncommon in San Diego, Los Angeles and north to San Francisco. The parsnip (*Pastinaca sativa* L.), another weed though not as frequent as it is in Iowa, occurs from San Diego to Oakland and Patterson. The poison hemlock (*Conium maculatum* L.) occurs not only in southern California, San Diego, but in Los Angeles and elsewhere. It has become one of the most common roadside weeds in the Oakland district, Santa Cruz and Monterey, especially in damp places. The celery (*Apium graveolens* L.) which is so carefully cultivated in Iowa is a weed in the Bay region and Santa Cruz. Coriander (*Coriandrum sativum* L.) is a common weed in many places. One is interested to note that the common carrot (*Daucus Carota* L.) such a common and one of the unlawful weeds of Iowa, is rarely found in California, and Prof. Parish tells us "is a garden escape

which fails to permanently establish itself." The pimpernel (*Anagallis arvensis* L.) of the Primrose family is a frequent weed in central California, Patterson and along the coast, Santa Cruz and Monterey.

Our common morning glory (*Convolvulus sepium* L.) is not an uncommon weed in rich soil and the European bindweed or morning glory (*Convolvulus arvensis* L.) is a common weed in fields not only in Sacramento and the San Joaquin (Patterson) valleys, but from San Francisco south to Los Angeles and San Diego. It is therefore quite as well at home in California as in Iowa.

The nightshade family has a most interesting lot of weeds. The most striking weed which has become naturalized, especially in southern California, is the tree tobacco (*Nicotiana glauca* Graham) which is indigenous to Argentina, South America. S. B. Parish lists the Santa Clara Valley as the most northern locality. W. L. Jepson<sup>7</sup> states it is becoming common about interior towns and along the floodbeds of interior streams, and throughout the San Joaquin. It is not common at the north end of this valley; however it is naturalized in a few places like the Arroyo Del Puerto near Patterson. Southward in this valley as at Fresno, it is more common. Not uncommon in San Jose, Santa Cruz, Santa Barbara, and much more abundant in Los Angeles, and everywhere along streams and in floodplains of San Diego river, abundant near Ti Juana, Mexico.

Mention may be made of the following weeds, also of this family, one of the thorn apples (*Datura meteloides* DC) with a white purple fringed corolla, prickly fruit, sinuate dentate leaves common in the San Joaquin Valley at Patterson and abundant to Los Angeles and San Diego. This native plant is common along roadsides, gardens and fields. The Indians used this poisonous plant. The common thorn apple of the old world (*D. Stramonium*) and the (*D. Tatula* L.) may be seen occasionally. They are not common as in Iowa. The former was found at San Diego. The common black nightshade or stubble berry (*Solanum nigrum* L.) is common in waste ground in San Diego and Los Angeles. At San Diego it blooms all winter. S. B. Parish also lists the var *villosum* L. The buffalo bur, *S. rostratum* Dunal. I did not observe. One of the interesting weedy plants of the genus is the potato which appeared abundantly coming up as a weed in a garden in Berkeley.

Some weeds of the family *Scrophulariaceae* occur but far

<sup>7</sup> A Flora of western middle California. 2 Ed., 366.

less common than in Iowa; common mullein (*Verbascum Thapsus* L.) which is especially abundant in rocky sterile soil in southern and eastern Iowa. It is not common as a weed in California; found in a few places around old mining camps. The toad flax (*Linaria vulgaris* Hill) often occupying fields and waste places in Iowa, especially in northeastern Iowa, is rare or local. I did not observe it except near Berkeley.

Of the plantain family (*Plantaginaceae*) the most striking weed and quite as common as in Iowa is buckhorn or rib-grass (*Plantago lanceolata* L.) which attains large size. It occurs in fields and waste places especially under irrigation. I observed it in San Diego, Los Angeles, San Jose, Santa Cruz and Patterson. The common plantain (*Plantago major* L.) is not uncommon in cities as in San Francisco, Los Angeles and San Diego.

Another interesting weed found in California which rarely occurs in Iowa, though common from Ohio to Massachusetts, is fuller's teasel (*Dipsacus Fullonum* L.). I observed the weed near San Diego around the missions and no doubt it owes its origin here to the Spanish missionaries who used the plant to card wool. The weed also occurs in Oakland district of the Bay region.

The sunflower family (*Compositae*) contains many native and introduced weeds. The ubiquitous dandelion (*Taraxacum officinale* L.) is, according to Prof. S. B. Parish, a recent immigrant. It was first seen in Los Angeles by Davidson in 1891 and noted by S. B. Parish in San Bernardino in 1895. It was scarcely known to Brewer and Watson in 1876 and Eugene Hilgard did not mention it in 1890. J. Burt Davy reported it in Oakland in 1898.<sup>8</sup> W. C. Jepson reported it as frequent in lawns. It is not uncommon at Oakland, Berkeley, San Francisco, Patterson, Sacramento, Los Angeles, Santa Cruz and San Diego. It is however, not as abundant as in Iowa. It is an interesting question why the dandelion was so tardily naturalized in California while everywhere common in Iowa for many years.

Chicory (*Cichorium Intybus* L.) is a not uncommon weed in San Diego, and southern California, but certainly less common than in Iowa. I saw occasional plants of the vegetable oyster (*Tragopogon porrifolius* L.) especially near Santa Cruz, probably an escape from cultivation.

The common sow thistle (*Sonchus oleraceus* L.) is abundant from San Diego to the Bay region and in the San Joaquin valley. This weed is far less common in Iowa than in California. S. B.

<sup>8</sup> Flora of Western Middle California, 2nd Ed., 419, 1911.

Parish also reports *S. asper* L. and *S. arvensis*, the former especially where irrigation is practiced. The *S. tenerrimus* occurs in the San Diego region where S. B. Parish thinks it was introduced during the mission period. The Prickly Lettuce (*Lactuca scariola* L.) is not an uncommon weed in San Diego, Los Angeles, and San Francisco. The writer observed this in Sacramento and San Francisco in 1899. It seemed to be more common than the variety *integrata* Green & Goder. The observations of S. B. Parish would indicate that this is the more common type. The conditions are the reverse in Iowa. The variety was the common type in Iowa in 1899 while today the *L. scariola* is the more common. It has almost entirely replaced the variety.

Barnaby's thistle (*Centaurea solstitialis* L.) which has become a weed in Iowa is abundant and troublesome in the San Joaquin valley. Another common weed of this genus is the sand bur (*C. melitensis* L.) common in grain fields evidently an early introduction.

One would expect to find the Canada thistle (*Cirsium arvense* L.) abundant but it is not. I saw a single small patch in the Bay region. The bull thistle (*C. lanceolatum* (L.) Scop) is more common in the Bay region. On the other hand, the milk thistle (*Silybum marianum* Gaertn), a tall branching spiny plant is common not only in the Sacramento and San Joaquin valleys but south to Los Angeles and San Diego. Another weedy plant is the blessed thistle (*Cnicus benedictus* L.) especially near Santa Cruz. The true artichoke (*Cynara Scolymus* L.) is a frequent roadside weed, especially near Santa Cruz. The burdock (*Arctium minus* Bernh.) so common in Iowa is rather rare in California. The common groundsel (*Senecio vulgaris* L.) a low herb with greenish flowers is a most abundant weed in San Jose, Patterson, Oakland, Santa Cruz, Los Angeles and San Diego, growing with *Erodium*, *Plantago lanceolata*, etc.

The mayweed (*Anthemis Cotula*) occurs in waste places, but far less common than pine apple weed (*Matricaria suaveolens* Buchenau). The former in Iowa is one of our very common weeds while the latter is infrequent. Just the reverse is true in California. The European cocklebur (*Xanthium strumarium*) which does not occur in Iowa is not uncommon. Several other cockleburs like *X. pennsylvanicum* Waller and *X. spinosum* L. occur in California. Several sunflowers are common along roadsides, like the common sunflower (*Helianthus annuus* L.) abundant along irrigation ditches and roadsides. Spanish needles

(*Bidens frondosa* L.) is not uncommon in irrigated gardens and fields, especially northward.

The common horseweed (*Erigeron canadensis* L.) is common in waste places and fields from Sacramento to Patterson, and Los Angeles. The *E. bonariensis* L. is, however, much more common in waste places, San Jose, Los Angeles, and San Diego. The tar weeds (*Hemizonia luzulaefolia* D.C. and *H. virgata*, Gray, *H. Kelloggii*, Greene) are conspicuous weeds after the grain crop has been harvested. The *Madia sativa* Molina is one of the abundant tarweeds of California.

There are many alien plants in the grass family, *Gramineae*. Some of these have swept over the entire state and are important constituents now of the grass flora of the foot hills and coast ranges, and without these plants the forage would often be quite short for live stock. The common wild oats (*Avena fatua* L.) is common throughout the state, and the writer observed it at San Diego, Los Angeles, Patterson, Berkeley, Oakland, Sacramento, and Stockton. The slender wild oats (*Avena barbata* Bort.) is not uncommon in southern California. The writer saw it as far north as San Francisco. The wild oats undoubtedly was one of the early introductions into California, probably introduced by the missionaries. Both species are native to Europe, especially in the Mediterranean region.

Another not uncommon grass, also weedy, is velvet grass (*Holcus lanatus*) which is found in the Oakland district and not uncommon in the foothills of the Sierra Mountains. There are also several species of *Bromus* common throughout southern and central California. Of these attention may be called to the soft chess (*Bromus hordeaceus* L.) but the most common member of the genus is the *Bromus unioloides*. The wild barleys are especially common. Of these the *Hordeum murinum* L. called wild barley, or simply barley, is abundantly naturalized in cultivated ground along highways. Not only is this grass injurious to livestock but it crowds out cultivated barleys and oats. The rat-tail grass (*Festuca myurus* L.) is common in places in cultivated soil, especially along the coast. The common annual spear grass (*Poa annua* L.) is common in many places from San Diego to San Francisco and along irrigation ditches and moist places. *Polygonum monspeliensis* Desf. is commonly naturalized at Santa Cruz, Monterey, and San Diego. Another common weed is barnyard grass (*Echinochloa crusgalli* Bauv.). When it comes to our millets it is rather interesting that they are far less common than in Iowa. Prof.

S. B. Parish states that the green foxtail (*Setaria viridis*) is a recent introduction. The writer observed it in a few places. Another weed far less common than in Iowa is the crabgrass (*Digitaria sanguinalis* Scop). The tickle grass (*Panicum capillare* L) so common in Iowa, is represented by a western variety var. *occidentale* Rydb. Johnson grass (*Sorghum halepense* L) is becoming more or less common, especially in the southern part of the state.

There is a class of naturalized plants in California, which, though not strictly weedy, are common. Of these mention may be made of the so-called geranium (*Pelargonium zonale* Willd) which is native to South Africa. It is not an uncommon escape in San Diego. The large yellow flowered Oxalis (*Oxalis cernua* Thunb) Bermuda buttercup, is common in the San Joaquin Valley, especially in lawns, appearing as a native plant. The common nasturtium (*Tropaeolum majus* L) is not an infrequent escape in San Diego. The castor oil plant (*Ricinus communis* L) is a frequent escape in San Diego. It is woody. The mignonette (*Reseda odorata* L) is an occasional escape in San Diego. The broom (*Cytisus canariensis* L) and furze (*Ulex Europaeus* L) are shrubby escapes in places along the Pacific ocean, the latter at San Francisco. Several species of Mesembryanthemum (*M. coccineum* Haw) and (*M. edule* L) so commonly cultivated to hold the shifting sands are not uncommon. The latter is naturalized at Ocean-side, San Diego, and Long Beach.

It is rather interesting that of the long list of exotic shrubby plants cultivated in California so few have escaped. Though the pepper tree (*Schinus molle* L.) is a common cultivated tree in California for a century or more, there are few escapes. I noticed a few escaped plants at different points near Los Angeles, but in only one place along the Santa Anna River did I see a considerable number of young plants. The eucalypts are common but in few places is the tree spontaneous. The same is true of the acacias. The weed problem is interesting everywhere. Why some plants should be able to adapt themselves more readily than others is an unsolved problem.

AMES,

IOWA.