

## MADDER.

MADDER (*Rubia*), a genus of plants of the natural order *Rubiaceae*, very nearly allied to the genus *Galium* or Bedstraw (q. v.), and differing from it chiefly in having a juicy fruit resembling two small berries growing together. The species are found in the tropical and warmer temperate parts, both of the Old and New Worlds, and are important for the colouring matter of their roots. The most important is the COMMON M. or DYER'S M. (*R. tinctorum*), a native probably of the south of Europe as well as of Asia; and now very extensively cultivated in most European countries, and also in the East Indies, China, &c. It is a perennial, with weak stems and whorls of 4–6 elliptic or lanceolate glossy leaves, the stem and leaves rough with sharp prickles; small greenish yellow flowers, and black fruit.—Munjeet (q. v.), or INDIAN M. (*R. munjista* or *cordifolia*), ranks next to it in importance.—The roots of *R. peregrina* and *R. lucida* are also used in some parts of the Levant. *R. peregrina* is found in the south-west of England, and is called WILD MADDER. It is very similar to *R. tinctorum*. The roots of *R. rebun* and *R. Chilensis* are used in Chili and Peru.

There is no material of greater importance to dyers than M. (*R. tinctorum*), not only from the great beauty of the colours obtainable from it, but also from the ease with which it can be worked, and the great variety of its applications. Although the M. plant thrives best in warm climates, it may be, and is successfully cultivated in northern districts. The Dutch province of Zeeland has long been celebrated for the large crops of M. produced there; and until about 40 years since, our dyers rarely used any other than Dutch M., which was always sent ground and packed in large casks; but with the improvements in dyeing, it was discovered that the roots grown in warmer localities possessed not only much superior qualities, but could be made to produce other and more beautiful shades of colour. Besides a genial temperature, M. requires a rich, deep soil and careful cultivation. It is usually propagated by cuttings or by shoots from the stocks of old plants; these are set about a foot apart, and in rows, three feet from each other; the planting takes place in spring; and sometimes the roots are lifted at the usual harvest-time for madder (October or November). In France and Germany, the markets are supplied with one year old (called by the Germans *röthe*), eighteen months old, and three years old, which is the best, and called by the Germans *krapp*, or M. *par excellence*. The roots are carefully raised with forks, to prevent breaking them as much as possible; and after the soil is thoroughly shaken off, they are dried in stoves, and afterwards thrashed with a flail, to remove the loose skins and any remaining soil still adhering; they are then cut, or broken in pieces, and packed for sale, or they are sent to the mills to be ground. In Turkey and Italy, where the solar heat is great, the stove is dispensed with, the roots being dried in the sun. The more the roots are freed from the epidermis, the better the quality of the M.; hence, before it is ground in France, many manufacturers employ mechanical means, chiefly sieves worked by machinery, which rub off and separate the soft, dark-brown skin which covers the roots—this process is called *robage*. One year-old roots cannot be profitably dressed in this way, and are therefore ground with the epidermis. Much of the inferior Dutch M. is also ground without dressing, and such is called *mull* in trade. The grinding is effected in mills with vertical stones, and the meal is passed through sieves of different degrees of fineness, which gives rise to various qualities in the market. These qualities are

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numerous, and have special marks to distinguish them, well known to merchants, but are of no general interest. The M. from Turkey and from India never comes to us ground, the roots are merely broken up into pieces an inch or two in length, and packed in bales. Very small quantities of M. occasionally reach us from Russia; it is the produce of the government of Baku, on the Caspian Sea, and is said by our dyers to be the finest in the world.

As might be expected of a substance of such vast commercial and manufacturing value, M. has undergone the most elaborate chemical researches. Its dyeing quality has been known for at least two thousand years, and its medicinal qualities are also mentioned by Pliny and Dioscorides. The former writer, referring to its value as a dyeing material, says: 'It is a plant little known except to the sordid and avaricious, and this because of the large profits obtained from it, owing to its employment in dyeing wool and leather.' The M. of Ravenna was, according to Dioscorides, the most esteemed. Its cultivation in Italy has never been discontinued; and under the present enlightened government, it has received such an impetus that the exports of the Neapolitan provinces alone, in one year, exceeded in value a quarter of a million sterling. It was about the beginning of the present century that the colouring matter of M. began to attract very especial attention. It had long before been noticed that cattle which used the green parts of the plant as fodder had a red colour communicated to their bones, which was only removed by discontinuing this kind of food for a considerable time. This shewed the colouring matter to be capable of isolation; dyers also began to suspect that the colour produced was a combination of two—one red, and the other a purplish brown. But Roubiquet, a French chemist, about 1820, demonstrated that M. contains two distinct colours, capable of being isolated and used separately; he called them Alizarine and Purpurine—the former, he asserted, gave the bright red, and the latter the purple red colours. Practically, Roubiquet's statement may be held to be correct; but the recent and more elaborate researches of Dr Schunck, of Manchester, have shewn the composition of M. to be very complicated indeed. At the meeting of the British Association in 1861, he shewed the following chemical principles, all obtained from this remarkable root: 1. Rubianine; 2. Rubianic Acid; 3. Rubianite of Potash; 4. Purpurine; 5. Chlorrybian; 6. Pthalic Acid; 7. Alizarine; 8. Rubiadine; 9. Chlorrybiadine; 10. Rubiafine; 11. Rubiacine; 12. Rubian; 13. Verantine; 14. Perchlorrybian; 15. Rubiagine; 16. Grape-sugar; and 17. Succine. Within the last three years, artificial alizarine has been produced, and is now extensively used by dyers. It is one of the numerous series of aniline colours.

Dyers employ M. for giving the celebrated Turkey-red to cotton goods, and for this purpose employ means for developing the alizarine; and for purples, lilacs, and pinks, which are obtained by means of the purpurine. Manchester, Glasgow, Paisley, Alexandria, and other places on the banks of the Clyde, are the chief seats of this industry; the imports of M. into Britain in 1875 amounted to 126,152 cwt., amounting in value to the sum of £410,993.