TARCHONANTHUS CAMPHORATUS

A new cosmetic plant from Africa that also protects against insect bites

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BOTANICAL DESCRIPTION:
Tarchonanthus camphoratus is a bush or small tree belonging to the family of the Asteracee, which rarely reaches six metres in height. Greyish in appearance which gives it its name in the local dialect, "grey bos" (grey bush), it is found in a wide range of habitats. The leaves are oblong, with the upper part dark green with veins, and the lower part is pale grey and felted. The small creamy-white flowers are then followed by small woolly fruit. The fruit is a small seed covered by woolly white hairs, making it look like a ball of cotton wool. Although the best time for these seeds is late winter and spring, they can be found on the tree all year round.

The traveller hiking along the mountainous slopes of Eastern Africa, crossing the long "line" in the form of a plateau that stretches from Eritrea to South Africa, is surrounded by a penetrating balsamic scent, as he cannot avoid treading on the low branches of an invasively growing shrub which is called "Leleshwa" by the Swahili-speaking native peoples and which the first English settlers called "Wild sage" and has the botanical name of Tarchonanthus camphoratus.
Tarchonanthus camphoratus is practically absent from the whole of West Africa, even at the same altitudes, from which it can be deduced that its growth is strongly influenced by environmental factors, such as soil and humidity, evidently optimal for this plant only in Eastern Africa. One of the first mentions of the medicinal properties of Tarchonanthus camphoratus is certainly the analytical publication by Pappe (1) in 1868, who quotes, although in general terms, its medicinal and diaphoretic properties and identifies a substance with an odour similar to camphor.
The first Italians to speak of it were Canzoneri and Spica (2), who in 1882 emphasised the febrifuge properties of a decoction of the leaves of Tarchonanthus camphoratus and attempted to make a first analytical study but without convincing results.
It was not until the early twentieth century that the scientific research that accompanied European colonisation gave rise to a series of studies on numerous properties of Tarchonanthus camphoratus which were apparently disassociated from one another. Watt and Breyer (3) refer to fumigations of Tarchonanthus camphoratus against headaches or as a soporific. In the same publication, reference is made to "cigars" of Tarchonanthus camphoratus smoked by the natives of South Africa as anti-rheumatics.
We then come to the first definition of the physical characteristics by De Stefani and the research by Paolo Rovesti carried out in Eritrea on behalf of the Italian government in 1931-32 and then published in 1956 (4) which show analytical quantitative data, as well as a series of observations on its uses (in particular as an anti-inflammatory) by the local populations. Lastly, the first systematic analytical study, also including the optical isomers (5), showed that that the actual content of camphor was very low, and that the camphorated odour derives from other terpene substances, such as phenol.
My interest in this plant started with a series of observations during a stay in Kenya in 1991. I had noticed that in the villages, in the centre of the circle of huts, fires were lit in the evening using this plant, the leaves of which, apparently odourless, gave off a strong balsamic-camphorated odour on coming into contact with the flames. The natives maintained that when burning, this plant, that they called "Leleshwa", kept away mosquitoes, which are a real scourge in that part of the world (more than 10% of the population die from malaria).
To my surprise, I found that it was Tarchonanthus camphoratus. I thought it would be very interesting to study in further depth these "new" properties of the plant my father had studied sixty years earlier. I took a few kilos of leaves to my laboratory and we obtained, by distillation, a few grams of essential oil (the content of the leaves is 0.10-0.15%). With those few grams we began a very exciting experiment.

PROTECTIVE ACTION FROM INSECTS

This is undoubtedly one of the main characteristics of the essential oil of Tarchonanthus camphoratus. Beforehand, in a series of studies carried out on various types of mos-

Table 1

MINUTES	30		90		120		180		150	
ARM	R	L	R	L	R	L	R	L	R	L
TEST A	0	4	0	6	1	7	2	10	3	13
TEST B	0	3	0	5	0	7	1	9	2	11
TEST C	0	4	0	5	0	8	1	10	2	13
TEST D	0	2	0	6	1	7	2	10	4	12
TEST E	0	3	0	4	1	6	2	9	3	11
TEST F	0	3	0	5	2	7	3	10	5	12
TEST G	0	2	0	4	1	8	2	11	3	13
TEST H	0	3	0	5	2	9	3	12	4	14
TEST I	0	2	0	6	0	8	1	11	2	13
TEST L	0	4	0	7	2	9	3	11	4	13
AVERAGE	0	3.1	0	5.3	1	7.6	2	10.3	3.2	12.5

Table 2

MINUTES	30		90		120		180		150	
ARM	R	L	R	L	R	L	R	L	R	L
TEST A	0	3	0	5	0	7	0	8	1	12
TEST B	0	2	0	5	0	8	0	10	0	12
TEST C	0	3	0	6	0	7	0	11	0	13
TEST D	0	2	0	5	0	8	0	9	1	14
TEST E	0	4	0	6	0	8	0	10	0	13
TEST F	0	3	0	5	0	8	0	10	0	13
TEST G	0	1	0	3	0	4	0	6	0	10
TEST H	0	3	0	6	0	8	0	11	1	13
TEST I	0	2	0	5	0	7	1	10	1	12
TEST L	0	3	0	5	0	7	0	9	0	12
AVERAGE	0	2.5	0	5.1	0	7.2	0.1	9.4	0.4	12.4

quitoes (in particular Aedes Aegypti, Culex Quinquefasciatus and Anopheles Gambiae) both in Italy and Kenya in cooperation with the University of Nairobi and confirmed by direct experimentation at London's Institute of Tropical Diseases, we had remarked that preparations based on the essential oil of Tarchonanthus camphoratus, rather than keeping mosquitoes at a distance, stopped them biting. During the experimentation in cages with holes through which the two arms could be passed, one with the preparation to be tested and one with a blank test, using preparations based on DEET (Diethyltoluamide) mosquitoes went to the back of the cage (repellent effect) whereas with the preparations based on the essential oil of Tarchonanthus the mosquitoes flew near the skin, but without touching it: they did not sense the presence of the target. It should be recalled that mosquitoes perceive the presence of a warm-blooded creature through three principal data, signalled through the antennae placed on their head: warmth, humidity and carbon dioxide. The simultaneous signalling of these three data (which, incredibly, the mosquito perceives from as far as three kilometres away) unquestionably indicates the presence of a blood circulation. The fact that such a sensitive signalling system does not "sense" the circulation of blood in the presence of the essential oil of Tarchonanthus camphoratus, can only mean that this system has been deactivated, probably through a slowing down or temporary suspension of the activity of the specific neurotransmitters of the system. This mechanism is similar to what happens when patches against travel sickness are applied close to the ear: the signal controlling balance, which in an altered condition transmits the sensation of nausea, is annulled in the presence of the anti-histamines in the patch which act on the neurotransmitters. We will see subsequently that the parallel goes well beyond the example, when we discuss the anti-oedemigenous properties of the oil of Tarchonanthus camphoratus.

For the experiments mentioned above, we had prepared an acrylic gel containing 0.12% of essential oil of Tarchonanthus camphoratus (the same average content as in the foliage). We repeated the experiment in Italy, on ten volunteers (A-L) exposed with bare arms in various areas of the southern suburbs of Milan, for five hours, from 6.00 p.m. to 11.00 p.m.. The results are summarised in Table 1, where we have indicated with letter R the right arm (treated with the preparation based on Tarchonanthus camphoratus) and with L the left arm (treated with the same preparation without Tarchonanthus camphoratus) (table n. 1).

It can be seen that the disorienting action is total in the first 90 minutes, but then declines rapidly, although not showing a relatively high number of wheals.

We have deduced that the small quantity of essential oil is rapidly absorbed by the skin's stratum corneum, preventing the formation of the vapours which act on the mosquitoes' system of perception. However the anti-oedemigenous characteristic remains active which decreases the possible formation of wheals even in the presence of bites.

To prolong the action in time, we then produced a system of acrylic dispersion of an ester with high diffusion and relatively low cutaneous penetration (Diisopropyl adipate), in which the essential oil of Tarchonanthus camphoratus was solubilised to obtain the quantity of 0.12% in the final product.

The results are shown in Table 2, using the same characteristics and conditions as Table 1 (table n. 2).

A substantial difference of duration will be noticed which, in actual fact, lasts longer than the times indicated, from what we were able to see informally. We can therefore state that the essential oil of Tarchonathus camphoratus, included in suitable formulations, represents an alternative of the same efficacy and duration compared to preparations based on DEET, with the great advantage of

being completely natural and without side effects even in the case of prolonged use.
Although we did not carry out systematic experimentation with other insects, we noticed that the preparations based on Tarchonanthus had the same protective action relative to other insects, such as midges (drosophila) or horseflies (Tabanus Bovinus), although probably with a different mechanism of action, and in any case in relation to the physiology of the insect.

SOOTHING AND ANTI-OEDEMIGENOUS ACTION

During the "anti-mosquito" experimentation, we had noticed an apparently surprising event. In particular during the experimentation shown in Table 1, after the first two hours, some mosquitoes landed on the skin, but without causing wheals although the mosquito is known to bite when it touches on the skin.
Based on the observations of the Authors quoted at the beginning of this article, we presumed that penetration of the essential oil of Tarchonanthus camphoratus, which in the first preparation is also relatively fast, decreased or annulled the formation of the oedema and the sensation of irritation caused by the bite. We then tried to let the mosquito bite and apply the same preparation after the formation of the wheal. Within 5-10 minutes, in nine cases out of ten the sensation of irritation disappeared and at the most within half an hour the wheal disappeared as well, although a slight redness remained due to the hyperemization. From these observations we extended the tests to other insects, such as ants and wasps, using a preparation again based on the essential oil of Tarchonanthus camphoratus, but associated with a transdermal swab to take the epicutaneous area of the wheal to pH 6.8 – 7.2, and therefore annul, as well as the allergenic action of the protein fractions injected by the bite, any presence of formic acid (which some preparations on the market produce with an ammoniacal solution).
Here again, the results were highly satisfactory, and in over 65% of the cases the wheal and the burning sensation disappeared within 25-40 minutes.

ADJUVANT ACTION FOR SPORT

Again during my stay in Kenyan villages, I heard a story which seemed of fantasy or witchcraft. The Masai, a people of nomad herdsmen, said that before setting off on their seasonal migrations in search of the best grazing land for their animals, they placed two twigs of Tarchonanthus under their armpits. and this way they covered 50-60 kms. a day without feeling tired or their legs swelling. It is a known fact that at the end of prolonged physical effort, the increased presence of lactic acid simultaneously causes oedema (swelling) and a series of muscular contractions (cramp) which prevent continuing. At the same time, the oedema decreases the efficiency of the blood's micro-circulation, consequently also reducing the elimination of the toxins accumulated during the effort. In the case of the Masai, the sweat produced by the effort and by the heat macerated the leaves, releasing the essential oil of Tarchonanthus camphoratus, which then penetrated easily due to the great presence of pilosebaceous utricles in the armpits.
We then carried out some informal tests in Italy as well, and we noticed an actual improvement in sporting performances. In particular, a first division Swiss football team (the name of which we will not mention for professional confidentiality) tried a massage emulsion containing 0.3% of essential oil of Tarchonanthus camphoratus for one month, noticing a clear improvement in resistance to effort in time. However (and this is the most surprising thing) with physical recuperation and reduction in the feeling of tiredness in the days following the sporting performance. This shows (and also very importantly from the ethical point of view) that it is not a doping substance or analgesic, but an adjuvant in eliminating lactic acid and toxins at levels of physiological normality.

CONCLUSIONS

The experiments we have conducted have shown a "disorienting" activity of the essential oil of Tarchonanthus camphoratus for many types of insects that are annoying for man, and also a soothing and anti-oedemigenous capacity on wheals that may have formed before application.
These characteristics can also be used for post-bite preparations, but also as adjuvants in preparations for sport. before and after physical effort, to optimize performance and subsequent recuperation.

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