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**Ezize Huseynova**  
Nakhchivan State University,  
Azerbaijan

**Saleh Maharramov**  
Nakhchivan State University,  
Azerbaijan

## The antihelminthic efficiency of *N. meyer* Benth. and *N. cataria* L. species that spread in the nakhchivan autonomous republic flora

**Ezize Huseynova and Saleh Maharramov**

### Abstract

The article deals with the antihelminthic efficiency of *N. meyer* Benth. and *N. cataria* L. species spreading in the Nakhchivan Autonomous Republic flora and growing widely in the areas of natural pastures and hayfields. In the taxonomic spectrum these plants are included into the *Lamiaceae* L. (=Labiato Juss) family, Stachyoidae Briq. semi-family, Nepetae Benth. triba, *Nepeta* L. species. the both plants are essential oily. The main components of the essential oil compositions consist of nepetalacton. There have been used both the essential oil and aqueous extract as the anti-helminthic drug in the investigation. There have been got the high helminthosid efficiency *in vitro* and *in vivo*. The helminthocide efficiency of *N. meyer* Benth. essential oil was 78,6%, but *N. cataria* L. essential oil was 82,1%. This high helminthocide influence of essential oil is connected with being rich in nepetalakton isomers with bactericide composition. But anti-helminthic efficiency of aqueous extract of *N. meyer* Benth. and *N. cataria* L. respectively was 60,3% and 62,7%. So, the helminthocide drugs could be prepared by the essential oil and the aqueous extract of both plants and it is recommended to use them to cure helminthoses.

**Keywords:** *N. meyer* Benth., *N. cataria* L., essential oil, aqueous extract, nepetalacton, anti-helminthes

### 1. Introduction

In recent years, there have been increased using the chemically synthesized drugs against helminthes. These drugs destroy the helminthes, but also they gather in the adjoining animal organism and animal products and make aftereffect. While having such kind of animal products, the chemical substances make negative influence in the people's organisms too. Ultimate goal of the modern pharmaceutical chemistry is to get drugs that have been naturally synthesized within the plants. This is one of the state importance problems to investigate the natural wealth and study the usage perspectives from this point, too.

The antimicrobial, antifungal, antiviral and anti-helminthic effects of the plants being rich in effective fitoncide substances have been studied by some investigators [1, 3, 5]. The bactericid eatures of the *Nepeta* species including into the *Lamiaceae* L. have been investigated, too. The chemical compositions of these plants are rich in biological active substances as nepetalacton, epinepetalacton, sitral, geraniol, citronella, saponin. In most investigations, nepetalacton has found affirmation as an influential active bactericide substance against microorganisms, like other monotherpens [6, 9, 11].

Identification of the essential oil got from the *N. meyer* Benth. and *N. cataria* L. species concerning to the *Nepeta* L. genus, shows that the 63-70 % of the component composition consists of nepetalacton isomers ( $4\alpha,7\alpha,7\beta$  and  $4\alpha,7\alpha,7\alpha$ ). But there has not been met any information about anti-helminthic efficiency of the plants in the investigations. Helminthocide influence of the essential oil got from of *N. meyer* Benth. and *N. cataria* L. species have been studied by us.

### 2. Material and methods

Researches have been carried out in the laboratory condition. The purpose of the investigation is to study the efficiency of the essential oil and aqueous extract of the *N. meyer* Benth. and *N. cataria* L. species spreading in the Nakhchivan flora. The *N. cataria* L. species spreading in

**Correspondence**  
**Ezize Huseynova**  
Nakhchivan State University,  
Azerbaijan

the Ordubad region subalpine zones 2000-2400 m higher sea level and *N. meyer* Benth. spreading in the lowlands of the Julfa region, have been gathered in the phase of blossoming. The green over ground parts of the plants cut into small parts and dried in the shade. Essential oil has been got from the dried plants by hydro distillation method [10]. Also there has been got the aqueous extract of dried plants. For this purpose, there has been taken 200 g dried plant mass, added 1l hot water and kept in the water bath for 30 minutes, cooled and filtered [7].

The helminthocide investigation has been carried out by method of *in vitro* and *in vivo*. To study the *in vitro* effect, there have been cut 15 sheep and taken helminthological samples from their intestines [8]. The taken samples have been investigated in the Nakhchivan State University Veterinary laboratory and there have been used the Vishnyauskas method while investigating the parasites [4]. The samples taken from the sheep intestines have been washed and purified and the helminthes found by helminthoscopic inspection were put into

the physiological solution. This *vivo* influence has been studied on 42 sheep.

### 3. Results and discussions

*In vitro* method, there have been used the essential oil got from the *N. meyer* and *N. cataria*, in the 2% alcohol solution, the cleared mixture in relation 1:5, 1:10 and 1:20; and also have been used when the aqueous extract prepared from the over ground parts of the plants. The experiences have been carried out on hemonxus, nematodirus, strongilyats and trixosefalyus es put into the physiological solution separately. According to the method the helminthes were first put into the influential solution and in each 15 minutes moved to the physiological solution and checked their passiveness or perishing [2]. There has been watched the perishing period of the helminthes that were put into the physiological solution. The results of the investigations are represented at Table 1 and 2.

**Table 1:** Helminthocide influence of essential oil got from *N. meyer* Benth. and *N. cataria* L. species (in the 2% alcohol solution) in the *in vitro* method.

| Helminthes            | Degree of becoming limp in the physiological solution |             |            |                      |            |            | Bowl of supervision |
|-----------------------|---|-------------|------------|----------------------|------------|------------|---------------------|
|                       | <i>N. meyer</i> Benth.                                |             |            | <i>N. cataria</i> L. |            |            |                     |
|                       | 1:5   | 1:10        | 1:20       | 1:5                  | 1:10       | 1:20       |                     |
| <i>Haemonchus</i>     | 2h.40 min.  | 2h.55min.   | 3h.15min.  | 2h.20min             | 2h.35min.  | 3h.05min.  | 25h.                |
| <i>Nematodirus</i>    | 2h.55 min.  | 3h.10min.   | 3h.30 min. | 2h.40min.            | 3h.        | 3h.20min.  | 27h.                |
| <i>Strongilyatus</i>  | 3h.25min.   | 3h.40min.   | 4h.20min.  | 3h.                  | 3h.55min.  | 4h.        | 28h.                |
| <i>Trichocephalus</i> | 23h.45min.  | 24h.40 min. | 25h.10min. | 22h.40min.           | 23h.30min. | 24h.10min. | 37h.                |

As seen from the table: Results got from the alcohol solution of the essential oil cleared in 1:5 relations was higher in comparison with other solutions cleared in 1:10 and 1:20 relations. This is connected with helminthocide influence of *N. meyer* Benth. and *N. cataria* L. essential oil. Also there has been specified from the table that, the helminthocide

influence period of essential oil differed depending on the kinds of the helminthes. *Haemonchus*, *nematodirus*, *strongilyatus* esperished in 2- 4 hours under the influence of nepetalacton, but *trichocephalus* can remain a live for 22-25 hours.

**Table 2:** Helminthocide influence of the *N. meyer* Benth. and *N. cataria* L. aqueous extract in the *in vitro* method

| Helminths             | Plants | <i>N. meyer</i> Benth. | <i>N. cataria</i> L. | Physiological solution |
|-----------------------|--------|------------------------|----------------------|------------------------|
|                       |        | Death period           |                      |                        |
| <i>Haemonchus</i>     |        | 4h.40min.              | 4h.20min.            | 25h.                   |
| <i>Nematodirus</i>    |        | 5h.10min.              | 4h.40min.            | 27h.                   |
| <i>Strongilyatus</i>  |        | 6h.40min.              | 5h.55 min.           | 28h.                   |
| <i>Trichocephalus</i> |        | 33h.                   | 32h..                | 36h.                   |

As seen from the results that, the helminthocide influence of both plants are close to each other. But the helminthes remaining alive for a long time in the physiological solution shows the high anti-helminthic efficiency degree of these plants. The experience shows that the *trichocephalus* perish in the anti-helminthic substances for 32-33 hours. This shows their partial durability against influential active substances. But in physiological solution death of *trichocephalus* happening later, in 37 hours, is the result of the helminthocide efficiency of investigated substances.

There has also been studied the helminthocide efficiency of the essential oil and aqueous extract of *N. meyer* and *N. cataria* species by the *in vivo* method. As the essential oil has the specific smell it has been cleared in olive oil in relations 1:3. Animals for investigation have been separated for 6 groups, 7 heads of sheep for each. Fecal was taken from the animals before the experience, done helminthoovoscopy by Vishnyauskas method, counted the *strongilyat* eggs and got an average number [4]. The essential oily drug was given to

the 1st and the 2nd group animals and the aqueous extract drug was given to the 3rd and the 4th group animals.

The 5th group animals were fed with green over ground parts of these plants, but the 6th supervision group grazed in the areas of natural pasture.

The 1st group animals were given to drink 4-5 ml *N. meyer* essential oily drug in the mornings for 3 days, the 2nd group animals were given to drink 4-5 ml *N. cataria* essential oily drug for 3 days in the mornings. These drugs supposed to have toxic influence. So the animals were kept under the veterinary supervision. At the result of the clinical inspection there was not registered any reaction to the environment, no heart stress, the body temperature was normal, any aggressive motion not being in behavior and the physiological processes, their breathing also was normal.

The 3rd group animals were given 100 ml solution of *N. meyer* in the mornings for 3 days. The 4th group animals were given 100 ml solution of *N. cataria* in the mornings for 3 days. The physiological processes of the animals were kept under control. The Vet registered the normal behaviors of the

animals and no heart stresses and there has been determined that the high doze of the drug was not toxic for the animals. The 5th group animals were fed by mixtures of *N. meyer* and *N. cataria* plants in the mornings for 3 days. The rest hours of those days the animals were fed with strong forage. The

supervised 6th group animals grazed in the areas of natural pastures and were not given any anti-helminthic drugs. At the end of the experience period there were taken fecal samples from the animals again and investigated. The results of the investigation have been marked at the Table 3.

**Table 3:** The anti-helminthic efficiency of the essential oil and aqueous extract got from *N. Meyer* Benth. and *N. cataria* L. Species

| Groups                                     | The number of eggs of the parasites / in 3g of fecal |                  |  |
|--|--|------------------|--|
|  | Before experience                                    | After experience | Anti-helminthic efficiency of the plants |
| Group 1. <i>N. meyer</i> essential oil     | 915,1  | 195,9            | 78,6%                                    |
| Group 2. <i>N. cataria</i> essential oil   | 894,5  | 160,1            | 82,1%                                    |
| Group 3. <i>N. meyer</i> aqueous extract   | 835,8  | 331,8            | 60,3%                                    |
| Group 4. <i>N. cataria</i> aqueous extract | 802,1  | 299,2            | 62,7%                                    |
| Group 5. Over ground parts of both plants  | 876,3  | 421,5            | 51,9%                                    |
| Group 6. Group of the supervision          | 925,3  | 938,9            | -  |

The investigation carried out in the *in vivo* method shows that the drugs got from *N. meyer* and *N. cataria* plants have high degree of anti-helminthic efficiency against gastroenterostomic strongilyats. As nepetalacton is the dominant component of the essential oils of the both plants the helminthocide results seem to be close. Though the 5th group efficiency intensity is not lower than the other group animals,

but it is not considered to be satisfactory. The supervision group that were not given the Helminthocide drugs, there have been observed not only decrease but even increase in the number of the helminthic eggs before and after the experience. This result shows the anti-helminthic efficiency of the plants that we studied above.

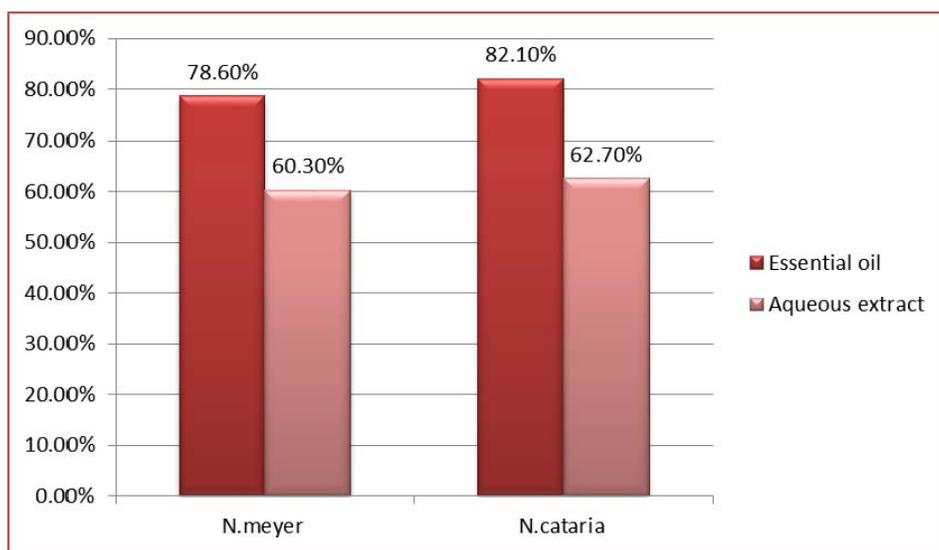


Diagram 1: Anti-helminthic efficiency of *N. meyer* Benth. and *N. cataria* L. species applied in 3 days

As seen from the Diagram the Anti-helminthic efficiency got from essential oils was comparatively rather higher than aqueous extract. This is connected with essential oil compositions being rich in effective bactericide monoscaviterpens. The results were comparatively higher in essential oil than aqueous extract. So in *N. meyer* it was 23,3% and in *N. cataria* it was 23,6%. The essential oils of these both plants are recommended to be used in the cure of the helminthoses.

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