

# APISTAN - THE RIGHT ROTATION

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## **PROTECTING EXISTING MEDICINES**

The number of medicines against varroa available in France is limited (Apistan (1989), Apivar (1995), and Apiguard (2001)). Since the middle of the 1990s, varroa resistance towards pyrethroids initiated in Italy, and spread in France. Pyrethroids are chemicals of a chemical family including fluvalinate, flumethrin, and acrinathrin.

Since pyrethroid resistance initially occurred, French beekeepers mainly use Apivar, an amitraz based medicine. However, resistance to other active ingredients also appeared during the same period in different parts of Europe. Amitraz (Italy, Spain, and some eastern countries), coumaphos (Italy and probably France) ...

Apiguard, a varroa treatment based on thymol, cannot always be used because of the temperature needed to reach a proper efficacy.

Apistan has been wrongly considered as an outdated means of varroa control. The only way to keep alive the few medicines available is to conduct a collaborative rotation plan for each region. Presently, some departments in France have been using amitraz consistently for more than 10 years.

However, there are good and bad rotation policies. We are presenting here our present knowledge for Apistan.

## **NATURAL DECREASE OF RESISTANCE**

Several scientific studies showed that when the use of Apistan is stopped for some years, the proportion of resistant mites tends to decrease naturally with time. The percentage of resistance of a population lessens by one half every year. This tendency was checked in isolated experimental apiaries and at the regional level in Italy (six production apiaries observed during four years) (1). The data is summarized in Figure 1.

Fig. 1 - Percentage resistance rate to Apistan over time, following cessation of Apistan® use

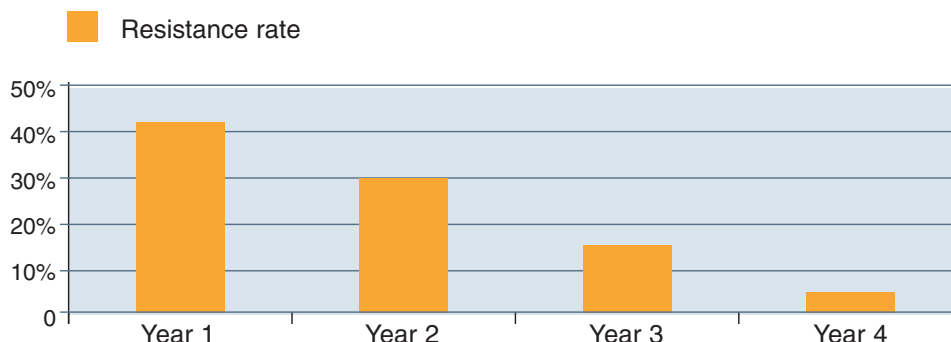


Fig 1

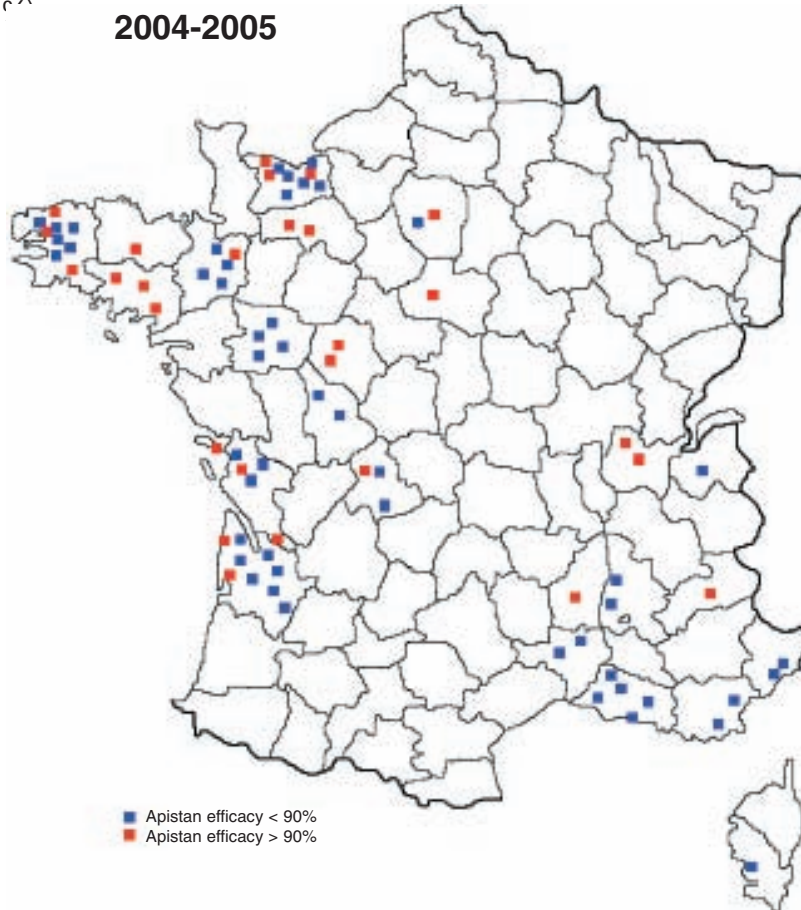
### **MONITORING CAMPAIGN IN FRANCE**

From 2004 to 2007, VITA-SWARM worked in collaboration with GDSA (Regional Sanitary Groups for Honeybees) to evaluate the level of varroa resistance to fluvalinate. Varroa samples were taken in several French regions and sent either to INRA (Magneraud - Charente Maritime (2004)) or to CNRS (Gif-sur-Yvette (2005 to 2007)). About 150 samples from 24 Departments were analysed. The method of analysis of resistance was the one described by Milani and used in the 1990s.

The results are presented on the map in Figure 2. Resistance has been converted into theoretical efficacy of Apistan. When the symbol is blue, efficacy is acceptable (>90%), if it is red, efficacy is too low (<90%)

**2004-2005**

Fig 2



### **THE RIGHT RHYTHMS OF ROTATION**

Based on the knowledge of the situation of a Department, it is necessary to build a strategy for several years. Even if varroa resistance to fluvalinate is strongly decreased, it is still potentially present. As soon as Apistan is used again, resistance is going to start to rise again. What then is the ideal rhythm of rotation for Apistan?

A series of tests performed over several years on several apiaries of an Italian region give a good indication of best practice

In Year 1, efficacy of Apistan was observed in a series of tests performed in eight apiaries in Friul (Italy). After resistance arrived in the region in the 1990s, Apistan was not used for about seven years. In Year 1, efficacy was 96% (Fig 3). When Apistan was used again the following year, efficacy slightly decreased to 91% - an acceptable value, though not ideal. In third consecutive year of Apistan use,

Fig 3

Year 1	Year 2	Year 3	Year 4	Year 5
Apistan 96%	Apistan 91%	Apistan 76%	Rotation with thymol	Rotation with thymol
	Rotation with thymol	Rotation with thymol	Apistan 92%	Rotation with thymol
			Rotation with thymol	Apistan 98%

efficacy sharply dropped to 76%. Thus, when resistance is present in a region, Apistan should not be used for more than two consecutive years.

Using Apistan in Year 1, and an alternative treatment in Years 2 and 3, gives efficacy of 92% in Year 4 and 98% in Year 5. The ideal rhythm, therefore, is an Apistan treatment every three or four years. Rotation can be performed with any medicine in which active ingredient is not a pyrethroid.

**CONCLUSION**

The length of the period during which use of Apistan was suspended gives an accurate indication of the potential of Apistan. In many regions varroa resistance is quite low and we can plan to use Apistan again successfully - especially in South France.

In the North West of France, it is necessary to wait longer before using Apistan again. This is because Apistan use was stopped later than in the south of France.

These results show the necessity of the rotation of varroa treatment. Even after Apistan resistance is encountered, the product can still be used again by following the correct rhythm of rotation. The return of Apistan, and the rotation method of treatment, has been successfully used in several regions in Italy, Spain, and France.

**REFERENCES:**

(1) N. Milani & G. Della Vedova - Apidologie - 33 (2002) 417-422