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INFLUENCE OF METEOROLOGICAL FACTORS ON AND THEIR HARMFULNESS TO POPPY STANDS IN THE CZECH REPUBLIC IN 1961 - 2000 YEAR

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Abstract

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Poppy (*Papaver somniferum*) is the traditional crop in the Czech Republic. The surveys of the appearance of some agents harmful to plants within the territory of the Czechoslovakia (Czech Republic) in 1961 – 2000 were used for elaboration of the set as given above. The particular agents are divided into four groups 1. The influence of drought (precipitation insufficiency, drought and influence of high temperature are involved in this group). 2. The influence of extraordinary heavy precipitation (there is hailstrom and other damage). 3. Damage caused by low temperature and frost 4.The influence of the harmful impact of wind weather (there are wind, erosion caused by wind and wind storm). The data, as above, testify the high sensitivity of the poppy to the course of climatic conditions. It has been confirmed that poppy is problematic crop.

poppy, drought, hail, precipitation, frost, wind

Poppy (*Papaver somniferum*) is the traditional crop in the Czech Republic. For the first time it was grown there as a a garden crop; since the end of the 18th century as the field crop (FABRY et al., 1975). Now it is the important commercial commodity and its area among crops encreases.

Poppy is the suitable model crop for search of the undersirable influence of meteorological factors. The example may be the fact that in 2000 the yield was reduced up to 15 732 t, first of all due to drought (ADAMEC, 2000).

The considerable fluctuation of poppy growing areas in 1958 - 2002 also confirms the dependence of this crop on the course of meteorological conditions (from Statisticical Yearbook of th Czech Republic (Czechoslovakia) 1958 – 2002: harvest area in 4 402 – 45 462 ha (average 12 311 ha) and Yield (in t. ha) 0,24 – 1,13 t/ha (average 0,67 ha).

Poppy seed germinates at 3 to 4 °C. The seedlings tolerate frost up to minus 8 °C, during the stem elongation up to minus 3 °C. This tolerance is coming down within the later growth stages, when temperatures from 6 °C to minus 3 °C may cause damage.The damp weather harms poppy at germination, at ripening as well as at harvest. The total requierement for water is estimated about 250 – 300 l/m^2 during the vegetation period.

MATERIALS AND METHODS

The surveys of the appearance of some agents harmful to plants within the territory of the Czechoslovakia (Czech Republic) in 1961 – 2000 were used for elaboration of the set as given above. These survays were issued by the ÚKZÚZ (till 1990), since 1991 by the State Phytosanitary administration. Only some selected harmful agents were reported in the form of the map filing till 1960. The administration division of the territory of the Czech Republic since

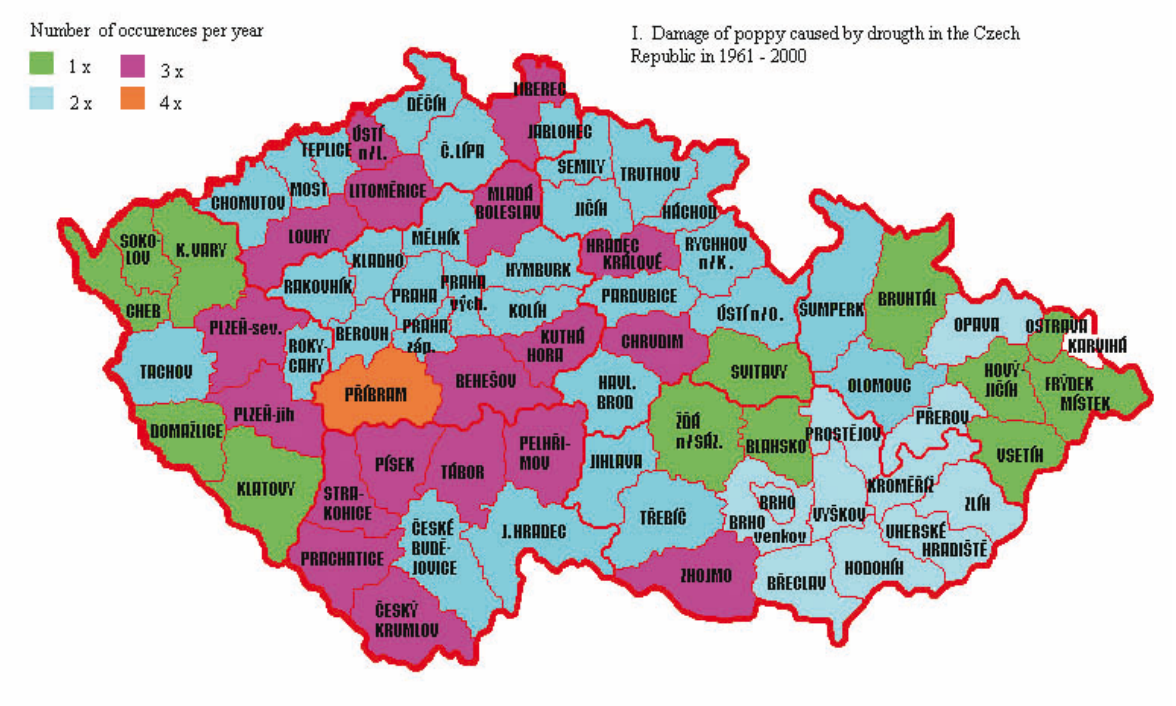
year 1960 with 75 districts in the given territory was used for the given survey.

The particular agents are divided into four groups

1. The influence of drought (precipitation insufficiency, drought and influence of high temperature are involved in this group).
2. The influence of extraordinary heavy precipitation (there is hailstrom and other damage).
3. Damage caused by low temperature and frost
4. The influence of the harmful impact of wind weather (there are wind, erosion caused by wind and wind storm).

RESULTS

1. Drought

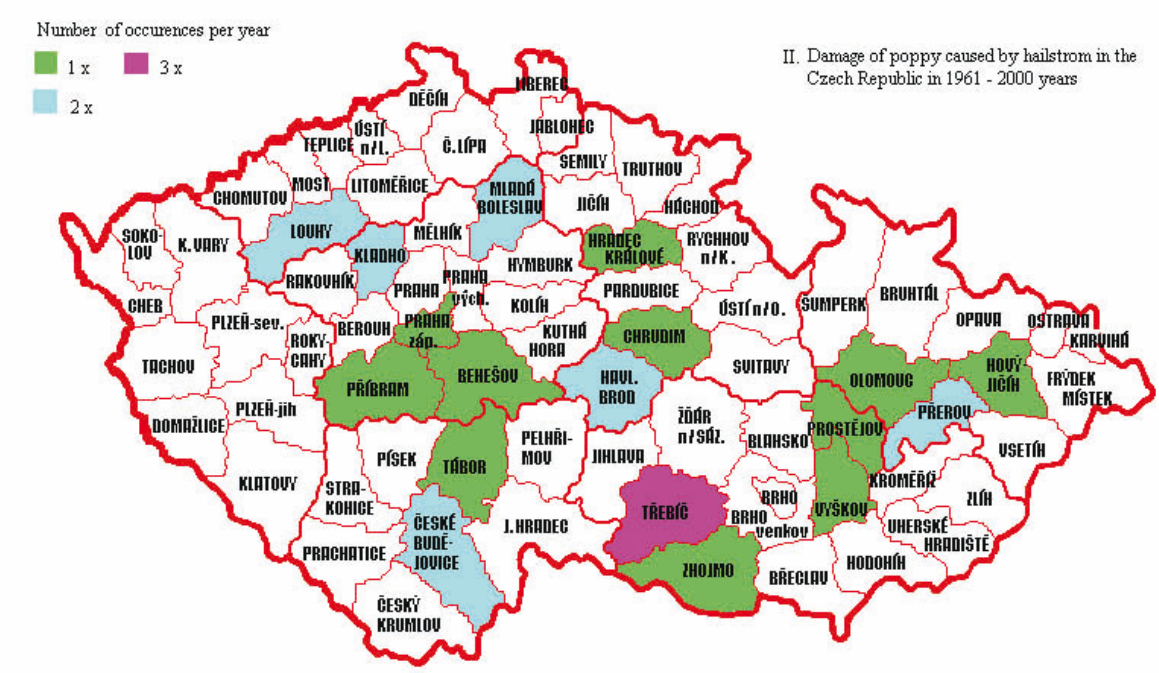


1: *Damage of poppy caused by drought in the Czech Republic*

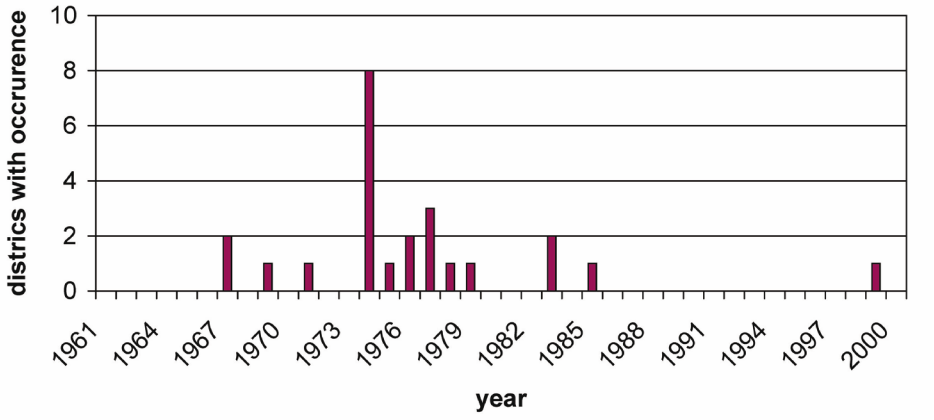
2. The Influence of excessive precipitation

2. 1 The influence of hailstorm

Hailstorm rather often causes damage of poppy within mentioned period in general 12 x.



2: *The Frequency of hailstorm reported from invidual districts*



3: *The Years with harmful hailstrom appearance*
The number of occurece of hailstorm in single districts of Czech Republik in 1961 - 2000 years

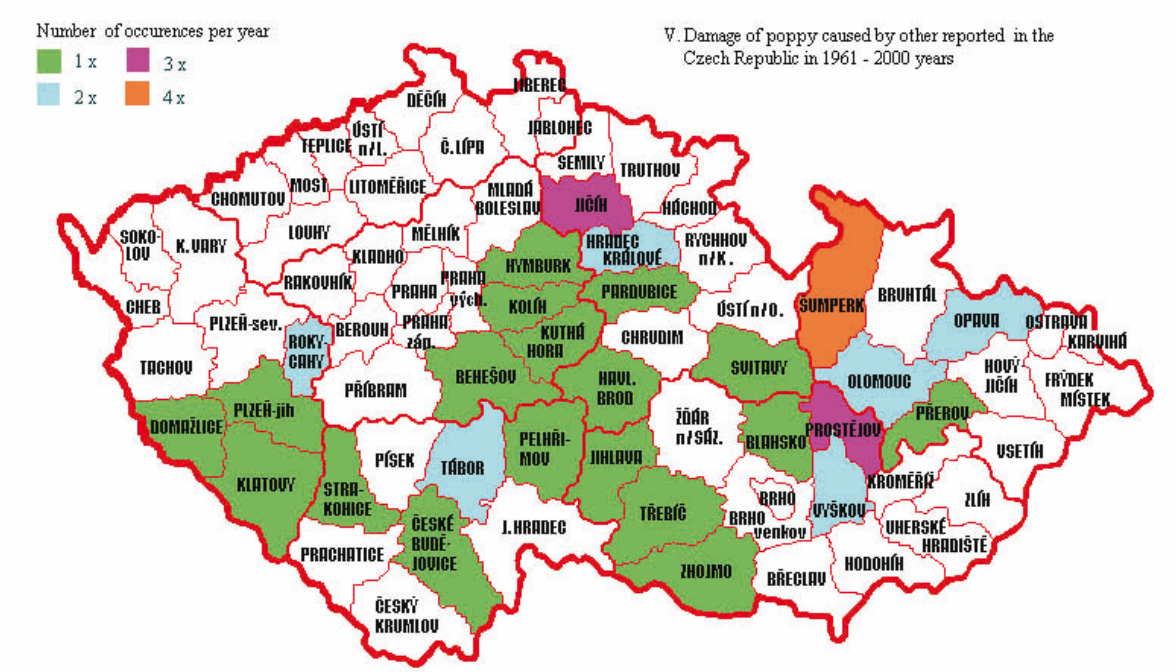
In 1999 two cases of damage were reported in district Přerov. There were reports from 17 district on the whole.

2. 2 Other damage

There are – heavy rain + storm, waterlogging, water erosion, floods in this category. There were 15 reports; 2 reports within 2 years (The map No. 4).

I: *Other reported damage*

Damage	Number of reports
heavy rain + storm	10
water erosion	3
floods and waterlogging	2



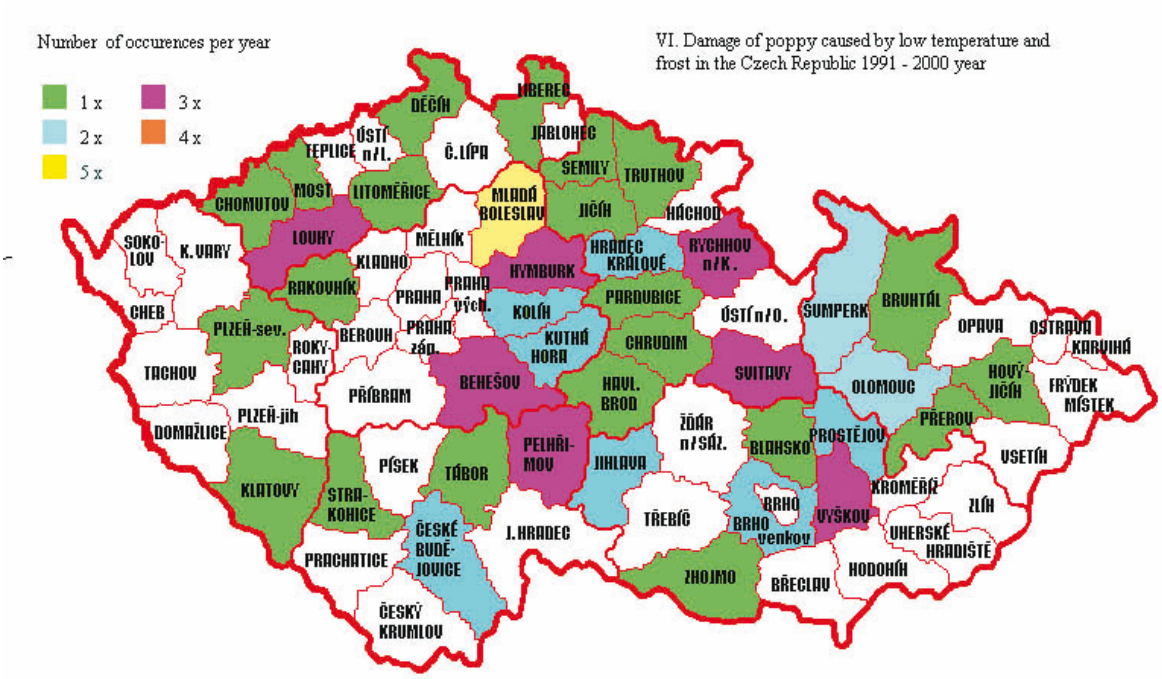
4: *Number of reports from single dictrict (other damage)*

3. Influence of temperature

3. 1 Low temperature a frost

Damage caused by low temperatures is 1967 year in district of Brno. The extend of the mentioned plough-down due to low temperature was in 1991. In 1997 poppy in district Chrudim was damage.

Within this time there were 12 reports. The most damane was in 1977, when damage was reported from 23 disticts (the map No. 5).



5: *Number of reports from districts (low temperature and frost influence)*

4. Weather conditions

There are three groups of damage – caused by category wind.

4.1 Wind

Damage caused by wind is reported from 12 years was (frequency 15 x). In 1966 – wind broke some stands at beginning of July in district Plzeň jih and Rokycany. In 1978 – after heavy rains with gust wind locally in districts Benešov, Hradec Králové (Nechanice 50 ha, N. Bydžov 20 ha, Smržov 23 ha), Jičín, Opava, Šumperk (Postřelmov a na Zábřeh 120 ha), the stands lodged 1979 – in district Louny (30.7.+9.8.) the wind displaced plants. In 1980 244 ha of poppy were with heavy damage due to night frost and strong winds and in May these stands were ploughdowned in districts Mladá Boleslav, 10 ha in district Pelhřimov.

Wind was the most frequent in South Moravia region in districts Vyškov (5 x), Hodonín, Kroměříž and Prostějov (2 x), in 1973 in Vémyslice in Znojmo district

DISCUSSION

The data, as above, testify the high sensitivity of the poppy to the course of climatic conditions. It has been confirmed that poppy is problematic crop FÁBRY et al. (1975) a ŠPALDON et al. (1986). Thi is supported by the fact that since 1920 the increase of poppy yield has not susseced (Anonym, 2001).

The drought within the mentioned period was reported in years 1964, 1974, 1988, 1992, 1993, 1994, 1997, 1998, 1999 and 2000. 7 cases from this cases were during last 10 years. In years 1964, 1974, 1988 and 1992 there were reports on the damage from single districts (extent 1 – 7 districts). In following years the damage appeared in the whole region. It confirms that poppy is very sensitive to drought, especially at germination as ŠPALDON et al. wrote (1986). Drought is very important; in year 2000 15 000 ha were ploughdowed (VAŇATOVÁ, 2001; SPITZER & FIŠER, 2001).

The influence of heavy precipitation - confirms that poppy is very sensitive to this factor at the germination as FÁBRY et al. (1975) wrote that it might destroy poppy plants. E. g. in 1984 in districts Strakonice, Domažlice, Jičín, Třebíč and Vyškov some stands were ploughdowned SPITZER & FIŠER (2001), and BENADA et al. (1963) stated that the factor is very important during flowering.

In 2000 these two factors were combined. There were heavy rains and cold. The establishment of poppy stands at the optimum terms was impossible in some localities . In the following period the extremly high temperatures and the drought caused the ploghdowns and low yields 0,5 t/ha. (POTMĚŠILOVÁ & ADAMEC, 2001).

Influence of temperatures – The damage caused by low temperature and frost (in 15 years) is more important than that caused by high temperature It appeared

only in 1 year. The most important from this group is frost. This is comfirmed by FÁBRY et al. (1975) that poppy is sensitive during the spindle period i. e. 45 – 60 days after sowing. In this time plants are destroyed already at -2 - 3 °C. E. g. in district Mladá Boleslav 224 ha poppy were ploughdowned. Low temperature and frost cause very important damage, because they harm plants in early growth stage.

Weather conditions – there is interesting the finding that the majority reports are from districts with lowlands. It is important at this time when poppy is growing in practicaly all regions of the Czech Republic.

This data confirm that climatic conditions are very important for poppy production as that it is very important for crop poppy (VAŠÁK & KOSEK, 2001) wrote.

SOUHRN

Vliv meteorologických prvků a jejich škodlivost na porosty máku v České republice v letech 1961 - 2000

Mák setý (*Papaver somniferum*) je tradiční plodinou. Na území České republiky se pěstoval nejprve jako zahradní plodiny. Od konce 18. století jako polní kultura (FABRY et al., 1975). V současnosti je významnou tržní plodinou, jehož plocha vzrůstá.

Semeno máku klíčí při teplotě 3 – 4 °C. Vzešlé rostliny snáší mráz až do - 8 °C, v dlouživém růstu je to až do - 3 °C. V pozdějším vývoji tato odolnost klesá., kdy poškození může způsobit teploty v rozsahu +6 - –3 °C . Vlhké počasí škodí máku jak při vcházení, tak i při dozrávání i při sklizni. Celková spotřeba vody se během vegetace odhadu je na 250 – 300 l/m^2 (BECHYNĚ et al., 2001; HAMERNÍK et al., 1960).

Mák je vhodnou modelovou plodinou pro sledování nepříznivého vlivu meteorologických faktorů. Byl sledován škodlivý vliv meteorologických prvků na porost máku setého na území ČR v letech 1961 – 2000.

Z meteorologických prvků to bylo sucho, ostatní poškození (prudký déšť, bouřka, vodní eroze, podmáčení), mráz a nízké teploty a větru. Vliv těchto prvků je důležitý především v počátečních vývojových stadiích.

Výše získané údaje potvrzují vysokou citlivost na průběh meteosituace, jak uvádí např. FÁBRY et al. (1975) a ŠPALDON et al. (1986). Mák je poměrně problematickou plodinou. O tom svědčí, že od roku 1920 se nepodařilo zvýšit výnos (Anonym, 2001).

mák setý, sucho, krupobití, srážky, mráz, vítr

REFERENCES

Anonym,: Pěstování máku v Česku. 2001, Úroda 49 (9): 1-2 (příloha)

BENADA, J. et al.: Atlas chorob a škůdců olejnin. Praha: SZN, 1963. 206 p.

BECHYNĚ, M., et al.: Mák. Praha: Savov, 2001. 127 p.

FÁBRY, et al.: Řepka, hořčice, mák a slunečnice. Státní zemědělské nakladatelství Praha, 1975. 358 p.

HAMERNÍK F., et al.: Rajonizace zemědělské výroby v ČSSR. Praha: ČSAZV, 1960, 746 p.

KADLEC, T. and VAŠÁK, J.: Odrůdy máku a jejich výsledky. Úroda 49 (9): 3 (příloha)

SPITZER, T. and FIŠER F.: Sledování škodlivých činitelů v máku v letech 1999 a 2000. 2001, Agro 6 (5): 32 - 37

ŠPALDON, et al.: Rostlinná výroba. Praha: SZN, 1986. 714 p.

ŠVEC, J.: Vývoj ploch a sklizní zemědělských plodin v letech 1990 – 2002. 2003. Available from http://www.czso.cz/csu/edicniplan.nsf/p/2102-03

POTMĚŠILOVÁ, J. and ADAMEC, J.: Olejniny. MZe ČR, Agrospoj, 2001, 16 p.

VAŇATOVÁ, P.: Mák neprodáme pod třicet korun. 2001, Zemědělec 9 (32)

VAŠÁK, J. and KOSEK, Z.: Mák ve struktuře rostlinné výroby. 2001, Farmář 7 (2): 26-27

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