



Short description of ASCHORF

for testing in working group 2 in COST 718

General:

The model ASCHORF (abbreviation of Apfelschorf (= apple scab)) calculates (1) the apple scab infection start on the basis of modified Mills's curve and (2) an infection index after Scharringa and Meijneke (SMI) for fruit cultures, both in dependence of calculated leaf wetness. ASCHORF has been developed by Dr. K.-P. Wittich, Braunschweig, DWD.

Input files:

(file formats: see ASCHORFE.doc)

<u>meteorological files:</u>	LG_ <i>year.station</i>	hourly longwave radiation	[W/m ²]
	RF_ <i>year.station</i>	hourly rel. humidity (2m)	[%]
	RG_ <i>year.station</i>	hourly global radiation	[W/m ²]
	RR_ <i>year.station</i>	hourly precipitation amount	[mm]
	TL_ <i>year.station</i>	hourly air temperature (2m)	[°C]
	VV_ <i>year.station</i>	hourly windspeed (10m)	[m/s]
	NG_ <i>year.station</i> (only if LG misses)	hourly cloud cover	[octas]
<u>further input file:</u>	ASCHORF.STA	starting file (input and output path, start and end date of calculation, start of conidia flight)	

Output files:

ASCHORF.LS1	<u>daily</u> results as time series: wetness hours, infection hours (Mills) , max.cumul. index (SMI)
ASCHORF.LS2	detailed result list, <u>hourly</u> values as time series: wetness situation, infection indices (Mills, SMI)
AMBERERG.station	wetness and infection results (for further processing into tables)

Background and most important instructions:

The model ASCHORF needs predominantly meteorological data. Weather forecast data can be easily included or attached. The only biological input is the date of bud-burst (should be the starting date of the run) and the assumption of the date of first significant conidia spore flight.

The leaf wetness duration (at the top of an orchard) is internally calculated based on physical principles of the energy balance and energy transfer. The dew duration and the lifetime of a raindrop on a leaf is handled separately.

Together with the other meteorological input data a worst-case scenario for ascospore and conidia infections is calculated.

Ascospore infections are calculated in spring, those by conidia beginning from early summer. The overall risk potential depends on air temperature and leaf-wetness duration during night and day.

The ascospore infection can be released by rain periods during daylight conditions as long as global radiation is above 10 W/m².

The conidia infections may start during rainy days and nights or in rainless nights under dew forming conditions, when the amount of dew reaches a level strong enough to drip off.

The infection risk is estimated using Mills's curves modified by Schwabe (1980) and MacHardy & Gadoury (1989). A further index after Scharringa & Meijneke integrates the temperature and wetness conditions in consideration of bridgable dry hours (which can be overcome by an ongoing infection process). Dependent on relative humidity dry periods of up to 16 hrs (i.e. no droplets on the leaves) can be bridged.

Light ascospore infections may occur when SMI>125, light conidia infections may start when SMI>145.

The date of first conidia flight is to be set in the ASCHORF.STA file. If the date is very exceptional, the program internally changes from ascospore to conidia availability (i.e. potential for infection) after allowing a maximum of 100 days as ascospore period or by forcing a switch at day 166 (15th of July) as the latest (for late spring areas).

For further details look into ASCHORFE.DOC.

Contacts: Hans Friesland hans.friesland@dwd.de

Deutscher Wetterdienst, Agrarmeteorologische Forschung, Bundesallee 50, 38116 Braunschweig / Germany
tel. +49-531-25205-0 fax +49-531-25205-45 www.dwd.de/services/gflw

References:

- MacHardy, W.E. & Gadoury, D.M. (1989): A revision of Mills's criteria for predicting apple scab infection periods. *Phytopathology*, 79., p. 304-310
- Schwabe, W.F.S. (1980): Wetting and temperature requirements for apple leaf infection by *Venturia inaequalis* in South Africa. *Phytophylactica*, 12., p. 69-80
- Wittich, K.-P. (1995): Some remarks on dew duration on top of an orchard. *Agric. For. Meteorol.*, 72., p.167-180
- Wittich, K.-P. (1998): Apple scab – potentials and limitations of operational infection forecasts in Germany. In: N.Dalezios (ed.): COST 77, 79, 711 Internat. Symposium on Applied Agrometeorology and Agroclimatology, Volos, Greece, 24-26 April 1996, Eur. Comm., EUR 18328 EN, Luxembourg 1998, p.229-234.

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