Imperial AGRICULTURAL BRIEFS

COOPERATIVE EXTENSION
UNIVERSITY OF CALIFORNIA

From your Farm Advisors

Features

February 2003

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TEMPERATURE REQUIRED FOR VEGETABLE SEEDLING EMERGENCE

Keith S. Mayberry

In the winter, many vegetable seeds are slow to emerge. When seed sits in the cold soil it often starts to decay rather than germinate and produce seedlings. The grower may believe the seed is to blame for the problem. More often low temperatures are at fault.

Sweet corn, for example, takes roughly 22 days to emerge at 50ºF soil temperature, but only 12 days at 59ºF. Tomato takes 43 days to emerge at 50ºF soil temperature, but only 14 days at 59ºF.

The following chart can be used as a rough guide to emergence times at various soil temperatures. Keep in mind that days to emerge within a crop species can vary depending upon seed treatment (priming), variety, seed age, planting depth, etc. This information is a guide only that can assist in making decisions on when to plant or when troubleshooting emergence problems.

DAYS REQUIRED FOR SEEDLING EMERGENCE* AT VARIOUS SOIL TEMPERATURES

	Soil temperature (ºF)								
Vegetable	**32**	**41**	**50**	**59**	**68**	**77**	**86**	**95**	**104**
Asparagus	NG	NG	53	24	15	10	12	20	28
Beet	/	42	17	10	6	5	5	5	/
Cabbage	/	/	15	9	6	5	4	/	/
Cantaloupe	/	/	/	/	8	4	3	/	/
Carrot	NG	51	17	10	7	6	6	9	NG
Cauliflower	/	/	20	10	6	5	5	/	/
Celery	NG	41	16	12	7	NG	NG	NG	/
Cucumbers	NG	NG	NG	13	6	4	3	3	/
Eggplant	/	/	/	/	13	8	5	/	/
Lettuce	49	15	7	4	3	2	3	NG	NG
Okra	NG	NG	NG	27	17	13	7	6	7
Onion	136	31	13	7	5	4	4	13	NG
Parsley	/	/	29	17	14	13	12	/	/
Parsnip	172	57	27	19	14	15	32	NG	NG
Peppers	NG	NG	NG	25	13	8	8	9	NG
Radish	NG	29	11	6	4	4	3	/	/
Spinach	63	23	12	7	6	5	6	NG	NG
Sweet Corn	NG	NG	22	12	7	4	4	3	NG
Tomato	NG	NG	43	14	8	6	6	9	NG
Watermelon	/	NG	/	/	12	5	4	3	/

*planting depth = 0.5 inches; NG = no germination; / = not tested; Source: Harrington, J.F. and P.A. Minges, Vegetable Seed Germination. California Agricultural Extension Mimeo Leaflet (1954).

DURUM QUALITY

Herman Meister

The minimum standards for durum quality acceptable to the grain trade is 13 % protein and 90 % HVAC (Hard Vitreous Amber Count). Durum below these standards can be blended with high quality grain if available, exported to foreign markets not interested in high quality pasta products, or sold as feed. Production of sub-standard durum is undesirable to the grower who is docked for not delivering a specified quality of grain according to the contract.

<u>Quality Indicators</u>
Grain protein and HVAC are convenient indicators of grain quality and can be measured rapidly by local grain companies. Yellow berry refers to a kernel with a starchy area encompassing a small portion of the kernel or the entire kernel. Yellow berry kernels are non-vitreous, and light does not pass through them. Vitreous kernels are literally glass-like in composition. The starchy areas in yellow berry are low in protein. Low HVAC count is related to low protein in a general way. Some varieties are more susceptible to yellow berry than other varieties even at similar grain protein levels. Also, a variety may form a yellow berry under certain environmental conditions, but not others despite equivalent grain protein content. Kernel protein is related to durum quality but other factors are also important such as color, milling characteristics, and the presence of gluten. The strength of gluten holds the pasta together and allows for thinner pasta products to be cooked quicker than thick-walled products.

<u>Causes of low protein</u>
Yellow berry and low protein content are related to many factors such as high yields, irrigation, soil texture, previous crop, weather, and fertilizer practices. Nitrogen supply is the single most important factor in limiting grain protein. Nitrogen is a component of amino acids, which are building blocks of proteins. Around 250 lbs of N per acre is needed to produce a high-quality durum wheat crop. Research indicates that split applications of nitrogen are more efficient in producing optimum yields and quality than a single preplant application of the total amount for the crop. A suggested program would be 75-100 lbs N pre-plant followed by 40 lbs of N at tillering, jointing, boot, and flowering. Late applications of nitrogen fertilizer during flowering have been shown to insure adequate protein levels, but not increase yields. Applications of nitrogen between flowering and 14 days later have been shown to increase protein content by about 1 %.

Over irrigation can leach nitrogen or make it unavailable due to lack of oxygen in the soil. Saturated soil conditions can lead to gaseous losses of nitrogen from the soil by the process of denitrification.

High grain yields can result in decreased protein simply due to protein dilution. The amount of protein on a per acre basis could be the same for high yields of a low protein wheat as for low yields of a high protein wheat.

Coarse textured soils may produce low protein grain since they are likely to have a higher leaching potential resulting in lower nitrogen availability.

The previous crop can influence durum protein content due the effect on soil nitrogen availability. A legume crop like alfalfa increases soil nitrogen availability for the next crop. Vegetable crops are heavily fertilized and result in high levels of residual nitrogen. Crops such as small grains, corn, and sorghum can immobilize nitrogen during decomposition.

EUROPEAN ASPARAGUS APHID MANAGEMENT

Eric T. Natwick

Asparagus growers and pest control advisors need to be aware of the European asparagus aphid. This aphid can be an extremely destructive pest and has caused economic damage in the Imperial Valley since its discovery here in 1985. Growers and pest control advisors should take immediate action to control this destructive pest upon confirmation of its presence in asparagus fields.

European asparagus aphids are only about 1/16 of an inch in length, have a blue-gray or blue-green appearance, and are often covered with a powdery wax excretion. Most aphids have long structures called cornicles protruding from the anal end of the abdomen on the dorsal side; the asparagus aphid has very short cornicles. The antennae are short and the cauda, a tail-like structure at the anal end of the abdomen, is relatively long and parallel-sided compared with other aphid species.

Female European asparagus aphids can produce nymphs asexually, (without males,) and viviparously, (live birth,) throughout the year in the Imperial Valley. Several generations of asexual reproductive females are produced each year. Populations build quickly and in dense populations, winged females are capable of flying to asparagus fields throughout our valley. With cool weather, males may be produced for sexual reproduction and females lay eggs, but this probably does not occur in Imperial Valley.

European asparagus aphids feed on stems and cladophylls (needle-like modified stems). The wingless forms of the aphids like to feed where the needles of the fern attach to the petioles. Their small size and coloration make them difficult to spot even upon close examination. The aphids inject a toxin, but do not transmit a disease-causing organism. Damage from the toxin consists of shortened internodes resulting in stunted growth or “Banzai” type growth, tufting of foliage where aphids are feeding and retardation of plant growth. Severe infestation causes an early, rapid release of new spears, which are very much reduced in diameter, causing a “witches broom” appearance. The toxin can remain in the asparagus plant for many months causing symptoms even after the aphids have been eradicated from a grower’s field. Plants weakened by the toxic effects of the European asparagus aphid feeding are susceptible to infection from plant pathogen.

Fusarium moniliforme and *F. oxysporum*, *F. asparagi* are able to attack stressed plants and cause a more severe disease than the same disease expression in “non-aphid” stressed plants. Therefore, aphid control is essential from the standpoint of disease management. The longer the aphids are present the greater is the chance of *Fusarium* root rot becoming a significant problem in the field.

Because asparagus is a perennial plant, the important damage is the impact of the European asparagus aphid feeding on the subsequent year's growth. The distorted growth is unable to adequately nourish the plant's crown and can permanently affect the production of marketable spears. The toxin may also cause a delay in bud break in spring followed by a profusion of small spears produced simultaneously. The impact is especially pronounced on newly established or weakened fields, and in seedling beds.

Natural enemies, especially parasitic wasps and lady beetles, help control European asparagus aphid populations. Most of the parasites have their greatest impact on heavy populations after the damage is done. General predators, such as lady beetles, may feed on some European asparagus aphids, but the European asparagus aphid's rate of reproduction can overwhelm the predators' impact. Encourage natural populations of parasites by delaying pesticide applications where possible.

No definite threshold has been established, but a high percentage of plants infested is more important than a high number of aphids on a few plants. The earlier in the season plants are infested, the more likely a small infestation will become a problem. European asparagus aphid populations start very slowly and in widely dispersed patches, and then seem to nearly explode. Populations often begin near field edges, so monitor the edges of fields regularly whenever fern is present. Treat with insecticides before colonies on a few individual plants produce winged aphids that will spread the infestation through the field and to neighboring fields.

HAY MOISTURE, THE MICROWAVE WAY

Juan N. Guerrero

National weather forecasters are still predicting that an El Niño weather pattern is expected for Southern California later this winter. Whether or not you choose to believe the weather people this winter, making hay during cooler winter days has always been a problem. The primary objective tool to determine baling moisture has always been a commercial moisture meter. Commercial hay moisture meters may, however, cost $200 or more. The common "feel method" is still used by many hay growers, but it is neither accurate nor consistent and a very subjective measure.

Hay should be baled optimally at 15-17% moisture. Hay baled at 15-17% moisture is soft and has good leaf attachment. Alfalfa hay baled at ≥20% may be prone to mold damage. Baled hay with <12% moisture is prone to leaf loss, decreased quality, and should be tarped for long-term storage to prevent further desiccation. However, hay baled at 15 to 18% moisture levels, over time, will shrink, often causing haystacks to collapse. Baling hay at optimal moisture levels is no easy task.

What do you do this winter when an apparent rain is coming and your hay is almost ready to bale and your moisture meter is not working properly, or worse yet if you don't own a moisture meter? Most homes have a microwave. There is a simple and accurate method to determine bale moisture that requires only a domestic food scale and a common microwave.

1. Weigh a microwave safe dish (a paper plate is OK) on the scale, this is the tare weight
   Note: for accuracy, the food scale should weigh either in grams or at least in 1/10 of an ounce

2. Add about 50 to 100 g (1.75 to 3.5 oz) of forage, cut into 1 to 2 inch lengths, to the dish, spread evenly
   Note: the hay material used should be taken using a hay-coring device, a grab sample from a windrow is OK, but a bale "flake" sample would not be appropriate

3. Weigh the dish with the forage (forage plus plate), record the weight (W_1)

4. Microwave uncovered, on high, for 6 minutes; make sure to place a glass full of water at the back corner of the microwave (to minimize charring); a microwave with a rotating platform works best

5. Weigh dish with forage, record the weight (W_2)

6. Microwave again for 2 minutes, if the forage starts to smoke, hit the microwave "stop" button, the forage may start a fire
7. Weigh dish with forage, record the weight (W_2)

8. Repeat steps 6 and 7 until W_2 stabilizes or forage starts to char, if forage starts to char use prior weight

9. Calculate % moisture of the sample
   % moisture=$((W_1 - W_2)/ W_1)* 100$
   (Remember to subtract the tare weight from W_1 and W_2)

This method may also be used to calibrate a moisture meter. Suppose you have a hunch that your meter is off by several percentage points and you want to be certain of your baling moisture, this method will assist you to calibrate your moisture meter. Numerous bales (≥20 per lot of hay) must be probed to determine the average moisture level of the stacked hay. I have probed a single hay bale four or five times at different locations and I have obtained four or five different moisture readings. Most commercial moisture meters have a reliability range of ± 3%. Happy microwaving!

VARIETAL RESPONSE TO POWDERY MILDEW AT DESERT RESEARCH AND EXTENSION CENTER IN 2002

Thomas A. Turini and Keith S. Mayberry

In spring 2002, the response of 24 muskmelon varieties to powdery mildew, which is caused by *Podosphaera xanthii* (formerly *Sphaerotheca fuliginea*), was compared at the Desert Research and Extension Center in Holtville, CA. Seeds were sown on 80-inch beds and the beds were irrigated with underground drip on 10 April. A list of the varieties and the sources of the seed appears in Table 1.

The experimental design was a 4 replication randomized complete block. Each plot consisted of 25 ft of one bed. Disease incidence was analyzed using ANOVA. Student Neuman Keul's Test ($P \leq 0.05$) was used to separate means.

On 24 June, powdery mildew severity on upper and lower leaf surfaces on each of 10 leaves was rated on a scale of 0 to 5, in which 0 was symptomless and 5 was covered with powdery mildew. The rating was based on percentage of the leaf surface covered with mildew. Results are presented as a percentage.

Powdery mildew severity was very low on all cantaloupe and honeydew varieties included. Relatively severe powdery mildew developed only on Golden Beauty casaba and Golden Crenshaw.

In addition, Jim McCreight (USDA, Salinas) planted powdery mildew melon differentials in Spring and Fall 2002. The race of *P. xanthii* present is defined by the melon entries that the fungus is capable of growing on. In spring, race 1 was present. In fall, the results of the test indicated that race 3 was present. This is important because it is likely that we do not have resistance to race 3 in our currently popular muskmelon varieties.

Table 1. Powdery mildew severity on melon varieties at Desert Research and Extension Center at Holtville, CA, 2002.

Cultivar (source)	**Declared resistance**	**Melon type**	**Powdery mildew severity(% leaf surface)**[y]
Mission (Asgrow)	1	Cantaloupe	0 C[z]
Primo (Novartis)	1 & 2	Cantaloupe	0 C
Sol Real (Novartis)	1 & 2	Cantaloupe	0 C
Silver World (Known You)	None	Honeydew	0 C
Emerald [OP honeydew]	None	Honeydew	0 C
Caravelle (Asgrow)	1 & 2	Cantaloupe	1 C
Cruiser (Harris Moran)	1	Cantaloupe	1 C
Hymark (Peto)	1	Cantaloupe	1 C
Impac (Asgrow)	1 & 2	Cantaloupe	1 C
Goldmine (Harris Moran)	1	Cantaloupe	1 C
Esteem (Novartis) (formerly RML 7923)	None	Cantaloupe	1 C
Mega Brew	1	Honeydew	1 C
Morning Ice (Harris Moran)	1	Honeydew	1 C
Santa Fe (Peto)	None	Honeydew	1 C
Saturno	1	Honeydew	1 C
Honey Ace (Takii) (formerly T-542)	None	Honeydew	1 C
Sun Canary (Known you)	None	Canary	1 C
Don Carlos (Seminis)		Cantaloupe	2 C
Gold Rush (Harris Moran)	1	Cantaloupe	2 C
Laredo (Peto)	1	Cantaloupe	2 C
Oro Rico (Harris Moran)	1	Cantaloupe	3 C
Valley Pac (Asgrow)		Cantaloupe	3 C
Golden crenshaw		Crenshaw	28 B
Golden Beauty	None	Casaba	53 A

[y] On June 24, 10 leaves per plot were evaluated based on percentage of leaf surfaces covered with powdery mildew.

[z] Means within a column followed by the same letter did not differ significantly according to Student Neuman Keul's mean separation ($P \leq 0.05$).

CIMIS REPORT

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of February 1 to April 30 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082).

The Irrigation Management Unit (IID) provides farmers with a weekly CIMIS update. Farmers interested in receiving the updated CIMIS report on a weekly basis can call the IID at the above number. Please feel free to call us if you need additional weather information. Or check the latest weather data on the worldwide web. Imperial County Weather Stations:
http://www.ipm.ucdavis.edu/calludt.cgi/WXSTATIONLIST?COUNTY=IM
California weather databases: http://www.ipm.ucdavis.edu/WEATHER/weather1.html
CIMIS web page: http://www.cimis.water.ca.gov/

Table 1. Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	February		March		April	
	1-15	16-28	1-15	15-31	1-15	16-30
Calipatria	0.12	0.15	0.18	0.22	0.26	0.29
El Centro (Seeley)	0.12	0.14	0.16	0.20	0.24	0.28
Holtville (Meloland)	0.12	0.14	0.17	0.21	0.25	0.28

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