Monthly Agromet Bulletin for Pakistan

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NATIONAL AGROMET CENTRE PAKISTAN METEOROLOGICAL DEPARTMENT SECTOR H-8/2, ISLAMABAD

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EXPLANATORY NOTE

- 1. This Agrometeorological bulletin is prepared on the basis of data from 15 stations of Pakistan Meteorological Department (PMD). These stations, selected in consultation with the agricultural authorities, represent major agricultural areas of the country. There are still important agricultural areas which are not represented by the stations included in the bulletin. This may be (a) because there are no PMD stations in these areas and /or (b) the fact that we had to limit the number of stations due to the requirement of speedy data communication and processing (both of which are important for producing and dispatching timely Agrometeorological bulletins).
- 2. Due to the above, all inferences and conclusions hold true primarily for the above areas and not for Pakistan territory which include areas that may not be very important from the agricultural point of view and the climate of which may not bear directly on agriculture in the major producing areas.
- **3.** The precipitation probability graphs at the end of the bulletin are computed using the long term records of these stations. The precipitations of the current season are plotted in this probability back ground. The use and interpretation of these graphs is clarified by an example. If the precipitation of a month in a station talley to an 80% probability, this means that 80% of the years (or on average 8 out of 10 years or 4 out of 5 years) the precipitation is equal to or less than the amount which was received during this month. One can also conclude that in 20% (100% 80%=20%) of the years (or on the average 2 out of 10 years or one out of 5 years) the precipitations during this month exceeds the present level.
- **4.** The evapotranspiration graphs at the end of the bulletin are based on computations using long term records of these stations. The evapotranspiration of the current season are plotted against this background. The reference crop evapotranspiration (ETo) is indicative of the evaporative demand of the prevailing atmospheric condition. It shows the rate of evapotranspiration from an extended surface of 8-15cm tall green grass cover of uniform height, actively growing. Evapotranspiration is, very roughly, 70% to 80% of ETo. However, it ranges from below 10% for a crop just emerging from the soil to over 100% for well watered densely planted tall crops under windy condition.
- **5.** The normally expected weather of next month is prepared on the basis of premise of normal or near normal weather prevailing during the coming month. As such it should not be confused with synoptic weather of the next month.
- 6. In the tables, the values in the parentheses are based on 1961 to 1990 normal. Normal values (in parenthesis) of Soil Temperatures are based upon 10 years data. Dotted line (---) means missing data. Solar radiation intensities are computed from sunshine duration using co-efficients developed by Dr. Qamar-uz-Zaman Chaudhry of Pakistan Meteorological Department.

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Highlights ---

• Above normal precipitation is reported from agricultural plains of KP, GB, Kashmir, Potohar region, central Punjab and below normal/dry weather reported from agricultural plains of southern Punjab, Sindh and Balochistan. Foggy conditions were also observed in plain areas of Punjab and frost was reported during the last decade of the month in plain areas of Punjab, Sindh and KP, which, affected/damaged orchards in these areas.

• Normal to slightly warmer temperature trend was observed in most of the agricultural plains of the country.

• ETo remained normal to below normal and R.H showed mixed trend in agricultural plains of the country.

• Agricultural soils showed mixed trend. Soils of Potohar region and lower Sindh remained slightly warmer than normal and soils of central Punjab and Quetta valley remained cooler than normal at major root zone.

• Picking/harvesting/crushing of potato, sugarcane and sowing of wheat/ seasonal vegetables were the major field operations in most of the agricultural areas of the country during the month. Farmers have mostly completed sowing of Rabi crops in irrigated areas.

• Keeping the present soil moisture and dry weather prevailing over most of the agricultural plains, farmers should now concentrate on weed control so that to stop/minimize any expected loss in yield due to weeds growth.

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CROP REPORT DURING DECEMBER, 2012

Picking/harvesting/crushing of sugarcane, seasonal vegetables and fruit orchids especially citrus and apple were the major field activities in most of the agricultural plains of the country during the month. Irrigation as per requirement and availability was provided. Pace of growth and developments of the crops both in irrigated and rainfed areas remained normal due to in time rainfall in the agricultural plains of the country during the month.

In **Punjab:** The sowing of wheat crop has almost been completed. The growth is satisfactory in irrigated / rainfed areas due satisfactory rain spells during the month. Sowing of Lentil crop has completed and recent rains may improve the crop early growth. The growth of oilseed crop is reported satisfactory and the crop is at flowering/pod stage. No serious pest/insect attack has been reported so far. The sowing of gram crop has completed. Normal growth of the crop is reported due to satisfactory soil moisture status. Harvesting/crushing of sugarcane crop is in full swing and very good yield is expected. Frost has affected citrus in some areas of Punjab.

In **Sindh:** Sowing of Rabi crops and harvesting of rice has been completed. Wheat crop is at tillering stage and its growth is reported satisfactory. Castor oil crop is growing satisfactory and its first picking has been started. Crushing of sugarcane is in full swing and very good yield is expected. Safflower and Linseed crops have been reported at good condition and are at vegetative stage.

Seasonal fruits like Guava, banana, Cheeko are in good condition. Cheeko and apple stone (Bare) are at fruit formation stage. Picking/harvesting of winter vegetables is in progress and good yield is being obtained.

In **Khyber Pakhtoonkhawa:** Sowing of wheat crop has completed and its normal growth has reported in irrigated areas as well as in rainfed areas during the month due to satisfactory rains, which may improve further due to coming winter rains. Harvesting/crushing of sugarcane crop is in progress and very good yield is expected. Harvesting of rice has completed. Harvesting of winter vegetables is in progress and these are available in the market. Growth of orchid is satisfactory and good yield of citrus has reported.

In **Balochistan:** Condition of standing crops and orchards is reported satisfactory. Wheat crop is growing at third leaf stage. All varieties of apples have developed colour and picking of the fruit is in progress. Sowing of Rabi crops has completed and wheat crop is in early growing stage. Condition of winter vegetables is good and is now available in the market.

In **Gilgit Baltistan**: Most of the agricultural activities stop during the winter season in the area. Soil has been prepared for wheat crop to be sown in the coming months.

MOISTURE REGIME DURING DECEMBER, 2012

In Pakistan, winter rains generally start in the month of December. During this December, normal to above normal precipitation was reported in upper half of the country and mostly below normal/dry weather reported in lower half of the country. Dry continental air prevailed over most of the agricultural plains of the country during dry weather.



The evaporative demand of the atmosphere represented by reference crop evapotranspiration (ETo) remained normal to below normal in most of the agricultural plains of the country except Quetta valley and Gilgit where it remained slightly above normal due to mostly dry weather observed during the month in these areas. The highest value of ETo was estimated in Rohri, Tandojam and Quetta valley. Main reason for below normal ETo in major agricultural plains is the cloudy/humid atmosphere prevailing during the month.



The mean daily Relative Humidity (R.H) showed mixed trend in the agricultural plains of the country. However significant drop in R.H was observed in areas of southern Punjab, Quetta valley and Gilgit Baltistan. Maximum value of mean Relative humidity was observed 72% at Sargodha followed by 67% at Jhelum and Lahore each, while the minimum value was observed at Quetta due to dry weather observed and its dry climate in this month.



From overall analysis of this month it is evident that moisture stress still exists in lower parts of the country due to dry weather observed in these areas during the month. Normal to above normal rains/snowfall in upper parts have improved soil moisture condition and will improve further in coming months due to expected rains.

TEMPERATURE REGIME DURING DECEMBER, 2012

Temperature plays vital role in the growth and development of crops. Thermal regime in this month remained mostly normal/slightly warmer in most agricultural plains of the country. Mean daily temperature remained normal in agricultural plains KP, Potohar region and Quetta valley and upper Sindh. Whereas it observed slightly above normal in central and southern Punjab and Gilgit (by 1°C), in lower Sindh represented by Tandojam it remained slightly below normal (by 1°C) .Mean daily temperature ranged 12 to 14°C in Khyber Pakhtunkhawa and Potohar region, 14to 15°C in remaining parts of Punjab, rounded to18°C in agricultural planes of Sindh, 0 to 6°C in Gilgit Baltistan region and it was observed 6°C in the high elevated agricultural planes of Balochistan represented by Quetta valley.



The night time temperature represented by mean minimum remained normal to slightly above normal in almost all agricultural plains of the country except Tandojam in lower Sindh and Skardu, where it remained below normal by 1°C. The lowest minimum temperature was recorded -15° C at Skardu.



Agricultural soils showed mixed trend in the agricultural areas of the country. In Rawalpindi division and Tandojam in lower Sindh, soil temperature remained normal to slightly above normal at root zones. In Faisalabad and Quetta valley, soil temperature at root zone remained normal to below normal during the month.



From the general analysis of soil behavior in this month, it is concluded that moisture has satisfactory status in the irrigated as well as rainfed areas. Moisture deficiency still exists in rainfed Potohar region and lower Sindh, whereas in major agricultural areas the situation of soil moisture is satisfactory to some extent. Hence overall condition of moisture content is mostly satisfactory during the month during early growing stages of wheat crop. Further rains in coming months will improve further soil moisture condition during coming months in rainfed areas.

SOLAR RADIATION AND WIND REGIME DURING DECEMBER, 2012

Total bright sunshine hours and solar radiation intensity remained normal to below normal in most of the agricultural plains of the country Mean wind speed throughout agricultural plains of the country ranged between 1 to 5 km/h with North-east to North-west and South trend. Maximum wind speed was observed 5 km/h in Quetta.







Comulative Rainfall, ETo and water stress for Rabi Season (Oct to April)



NORMALLY EXPECTED WEATHER DURING JANUARY, 2013

Winter rains with Pakistan region are associated with Westerly Waves and frontogenises processes taking place at middle latitudes. Westerly waves are always present around the globe. As soon as, perturbation takes place in these waves due to contrasting meteorological factors, they get amplified extending their trough down to lower latitudes in subtropical regions. Formation of fronts due to encounter of two air masses of different characteristics, is another significant source of winter weather systems. Winter rain bearing systems attain their maturity in December under normal meteorological behavior around the globe.

Rainfed plains of Balochistan and Potohar plateau are expected to receive 20mm to 40mm precipitation, which recharge the soil moisture upto some extent. However, the distribution over time and space would be much more important than the amount of the precipitation. The farmers of these areas have to show an efficient rain water harvest skill by completely rooting out the weeds, competing their crops for food and water. In other parts of the country, the rainfall may amount less than 20mm during January. The strict weeding practice is also recommended in irrigated areas.

The evaporative demand of the atmosphere will be lower than December due to cooler and upto certain extent the cloudy atmosphere. It is likely to range from 1 to 3 mm/day throughout the country. The mean daily relative humidity may vary between 50% and 65%. The crop growth may be retarded due to low temperatures; however, they would be beneficial in tillering process in cereal crop. The day time temperatures may range between 16°C to 20°C in Northern Punjab and upper Khyber Pakhtoonkhawa while in the low elevation plains are likely to experience them from 20°C to 24°C. The night temperatures possess a special significance; when they drop below freezing level and keep watch on the growth of animals and plants. If protection measures are not taken. Care of the frost kills the crop plants and even sometime badly affects their yield.

The minimum temperatures generally occurring at night may drop more frequently below freezing (0°C) in high elevation agricultural plains as compared to those located at low elevation. As days are smaller than nights during January; therefore the photo synthesis period may remain around 7 and 8 hours following still an increasing trend towards south. The intensity of solar radiations is likely to vary from 9.5 $MJ/M^2/day$ over Northern plains to 14 $MJ/M^2/day$ in the Southern parts of the country. Winds are expected to blow at a speed of 7 Km/hours or less, prevailing from northerly to westerly direction. Rabi crops will be around in their early stages of development, therefore their water requirements are not as high as mature crops. The estimates of monthly water requirement according to an average phonological phase of Rabi crops, in respective regions are given as under:

S. No	Region	Water Requirement		
	Kcgion	mm	Cubic meter per Hectare	
1	Khyber Pakhtoonkhawa, Northern and central Punjab	30 - 40	300 - 400	
2	High agricultural plains of Balochistan, Khyber Pakhtoonkhawa and Kashmir.	20 - 30	200 - 300	
3	Southern Punjab and upper Sindh	40 - 50	400 - 500	
4	Lower Sindh and Balochistan	45 – 55	450 - 550	

Seasonal Weather Update

Synoptic situation

- Jet stream (Zonal wind at 200 hPa) is weaker over west of the country from normal in December and persisted over normal location during December. (Average rain during January).
- Convergence of maximum wind speed expected area over the west of Pakistan is less than normal during current month. (Less rain during January).
- Geo-potential height at 500 hPa over west of the region is higher than normal which may cause change the track of western disturbances from normal towards north during December.
- North Atlantic Oscillation (NAO) is in negative phase and may effect on normal western disturbances track in the region (above normal precipitation) (Horrell pc-based monthly calculation of NAO).
- ENSO is expected to be in positive phase during Nov-January.
- Arabian Sea Surface Temperature is above normal by 0.5-1°C.
- Caspian Sea surface temperatures are 1.0 1.5°C higher from normal.

Seasonal Weather Outlook (Jan-13 to Mar-13)

Precipitation:

Persisted synoptic situation indicates complex situation such as jet stream indicates a normal while climatic index indicates more than normal precipitation in the country. As considering all the synoptic situation and climatic indices indication it is assumed that more than normal precipitation with more snow over mountains/ hilly stations during winter season (January-March, 2013).

It would result frequent penetration of cold air mass in upper parts that may yield more snow compared to liquid precipitation.

Temperature:

Cold wave will persist till mid of January and then night temperature will improve gradually. Normal night temperature will persist for the rest of the winter season all over the country. The westerly troughs may affect central parts of country in regular fashion that would result drop of temperatures in agriculture plains and yield frost.

Farmers may adopt precautionary measures to saves paddies.

Fog Prediction:

Synoptic situation favor for thick fog in central and upper parts of the country.

Montiny Quantitative Weather Forecast							
	Jan-13		Feb-13		Mar-13		
	Average	Expected	Average	Expected	Average	Expected	
GB	27.2	Above Average	29.7	Above Average	34.6	Above Average	
КР	49.0	Above Average	71.9	Above Average	92.5	Above Average	
AJK	91.1	Below Average	110.5	Below Average	127.5	Below Average	
FATA	30.2	Above Average	54.0	Above Average	67.4	Above Average	
PUNJAB	17.2	Average	27.2	Average	30.9	Above Average	
BALUCHISTAN	19.5	Average	20.9	Average	23.3	Above Average	
SINDH	3.0	Average	5.4	Average	4.7	Above Average	
		Precipi	tation is in m	m/month			
Pakistan	20.8	Above Average	27.2	Average	31.7	Above Average	
elow Average > -10 %.		Average precip	vitation range	e = -10 to $+10$ %.	Ab	ove Average > +10	

Monthly Quantitative Weather Forecast

Note: Average precipitation is computed by using Global Precipitation Climate Center (GPCC) gridded data by resolution $(0.5^{\circ}x0.5^{\circ})$ latitude by longitude. Ensembles of different climate models are used for computation of expected precipitation over the region.

WEATHER OUTLOOK FOR JANUARY, 2013



Expected Rainfall Departure for January



Expected Temperature for January



Expected Temperature Departure for January



-02 0 02 04 06 08 1 1.2 1.4 1.6 min 2m temp

WEATHER OUTLOOK FOR FEBRUARY, 2013



Expected Rainfall for February



Expected Rainfall Departure for February

Expected Temperature for February



Expected Temperature Departure for February





ماہ جنوری کے دوران کسانوں سے مندرجہ وٰیل گز ارشات طوط خاطر ر کھیک گز ارش ہے۔

ا۔ کورے سے بچاد کیلیے حالقی قد اہر پر تک جاری رکھی تکر دن کے دقت ہودوں پر تکوں سے حال گئی جہونیز کی کومورج کی ست سے کھول دیتا ہا ہے کہ بود امورج کی ردشن سے اپنی خوراک حالا رہے۔ اسطرح اتکی قوت مدالعت بھی میقر ارد ہے گی۔

۴ ۔ زراعت کی کامیا بی میں موکی حالات کا بہت عمل دخل ہےا در بہتر تھمت عملی سے غیر موزد ں موکی حالات سے استفادہ کیا جا سکتا ہے۔ تحکہ سوسیات کی بیٹن کوئی کوئی کوئی کوئی کوئی کوئی خطر رکھ کرزراعت کے ماہر میں ک مشادرت سے اپنے معمولات طے کر میں کہ بیدادر میں خاطر خوادہ اضافہ تکن ہے۔ سو کی حالات سے متلق مزید معلومات کیلیے تکھ موسمیات کے قریبی ارتبر سے رابطہ کیا جا سکتا ہے۔ جن کا چھ درن ڈیل ہے۔

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 - هه 👘 دیکبل ایگرد مید میشیز مایگریکلچرد ایس چی انسیتیوٹ ،نز دجام فرن نیسر: 7665833- 2222
- ۳. ریجنل انگرد میدن شیئر ،انگریکچردر بسری انسینیوٹ ،سریاب رد (یکوئٹ فون نیسر:-2211211-081-081 تفصیلی موکومات کیلنے تککہ موسمیات کی دیب سرائٹ <u>www.pmd.gov.pk</u> لا خطفر ما کمیں۔

پیلدار یودوں کدوئی اثرات سے بیانے کے لیما حتیا طی تد اپر کاجائنا بہت لا زمی ہے۔ جب رات کوکورا پڑتا ہے تو تشترک کی وجہ سے اپنی جم جاتا ہے تو وہ بلحا ظرفتم پیلنے کے عمل ے پتوں کے غلیے ٹوٹ جاتے ہیں اور بعد میں بنے مشک ہوجاتے ہیں۔ اگر کورے کی شدت بہت زیا دہ ہوتواس سے پودوں کی شہنیاں بھی مشک ہوجاتی ہیں اور بودوں کی نا تلاس تلقی نقصان ہوتا ہے جس سے پربدا واریر می طرح متاثر ہوتی ہے۔سدا بہا ریودوں میں آم، کیچی میں کا کا وارلیمن وغیر دکورے سے بے حد متاثر ہوتے ہیں ۔کورا زیا دوتر دسم، جنوریا ورفروری کے میٹوں میں یہ تا ہے کو رایٹ نے کاعمل اس وقت شروع ہوتا ہے جب دن کے وقت دھوپ پڑنے سے زمین اور بودے گرم ہو جاتے ہیں اور گردو پیش کی ہوا گرم ہو جاتی ہے۔ اس طرح باغات کے اوپرا بک گرم ہوا کی تہہ بین جاتی ہے۔ اور رات کو مدسلہ الٹ ہوجاتا ہے۔ زین اپنی ترارت میر وٹی شعاع کے زریعے صاف اور شعندے آسان کی طرف خارج کرتی ہےجس سے زمین کے قریب کی ہوا ٹھنڈی ہو جاتی ہے۔ مدینڈی ہوا گرم ہوا کی نسبت بھاری ہوتی ہے۔ اس لئے وہ زمین کی سطح کے قریب رہتی ے اور ات کو بیہوا کورے یا کہر کی فٹل انتیار کر لیتی ہے۔ باغبان حضرات کو دسمبر، جنوری اور فروری کے میٹوں میں بڑا مختاط رہنا جاہے۔ کم سے کم درجہ حرارت معلوم کرنے کیلیے مخصوص جكه ہو یا یخ فت بلند ہو تھر مامیٹر لگام جائے ۔ ایک تھر مامیٹر چارہ بیٹر جارہ کے لئے کانی ہے۔ اگر درد چرا رت 0.5 ذکر کی پیٹی کریڈ سے نیچ کر جائے تو کورار م نے کی تو تع کی جائجتی ہے۔اگر تھر مامیٹر موجود نہیں سے تو سا د دھر لیتے سے بھی کورا پڑنے کے با رہ معلوم کما جا سکتا ہے۔ اس طریقے میں ایک چوڑے پرتن میں آ دھاا کچ تکہ انی تک بانی ڈال کرا سے تھلے کھیت باباغ میں رکھیں اگر شام تک باتی جن لگےتو کو دارڈ نے کا اسکان ہوتا ہے۔ تر شاد دیکوں اور آم کے چھوٹے درختوں کو مردی اور کم سے بیانے کے لئے جنتر جیے یود کے چھڑیوں کا یود کے گا مت تک ڈھانجہ بنا کرا س کے اوپر پراٹی یو لڑھیں ہے دھانپ دینا جاہتے ۔بعض با غمان 🛛 ملطی کر نے جن کہ ڈھانجہ بنا نے بغیر کھوری پا پرالی ہے دھانب دیتے ہیں۔ پہطریقہ ٹھک نیٹیں ہے۔ پچھ پاغمان حضرات آم کے پاغ کے گر دکیلا کاشت کردیتے ہیںا بیا کرنے سے بیوداکورے کے نقصان سے تو یکی جاتا ہے لیکن یودے کی خوراک کابیشتر صد کیلا حاصل کر لیتا ہےاوراً م کے یود یکٹر ورہوجاتے ہیں۔ بعض با غبان حضرات کتور ،نومبر میں جار کے کصل یعنی باجر دوغیر ہ کاشت کرد ہے۔ ہیں اس طرح یود کورے سے فیکھ جاتے ہیں کیکن بہت سارے اجزاء خوراک جارے کی فصلات کی زرہوجاتے ہیں اور پھلدا ردرختوں کوفائد کے کا بجائے نقصان کانیتا ہے۔ یودوں کے نچلےصوں برمٹی ج ٹھا کررکٹیں تا کہ بانی شخاکہ نہلک سکےا وررا ت کے وقت اثرا بنائے لئے لیدے زیا دہ ہے زیا دہ جرا رہ جذب کرکٹیں۔ اگر میانی (inter cropping) فصل کی کاشت شروری ہوتو جوان یودوں کے پھیلا ڈیلیے منتقول جگہ چھوڑ دی جائے اوراس میں اچھی طرح یل جلایا جائے۔اگر برسیم کی کا شت کی گئی ہوتوا سے ان مہینوں میں زیرن کے بالکل قمریب سے کا مائے ۔ یو دوں کے شوں کوسفید ی کی جائے ۔ایسے یو دے جن پر چنوں کی چھتر کی ندینی ہواور کم عمر ہوں ان کے گردیوریوں، کھوریوں، برالی با پھر یوٹی تھیس لیٹ دی جائے کورے یا کہر کی متوقع را توں کو کھیتوں میں یا ٹی دیا جائے اس سے امرود، آم اور تر شاد پھلوں کو کورے کے اثر ابت ے با آسانی بیمایا جاسکتا ہے۔ باغبان حضرات گندم کے بھو سے گھا م پھوس یا کسی الہی چیز پر بھٹی میں استعمال شدہ فرنس آئل کوجلا کر مختلف جنگہوں پر دعواں پیدا کریں کیکن دھواں معمول طور ریم کرتا ہے۔ ہواتو ڑہا ڑوں کا استعال نصرف مردہوا ڈن سے بچاتا ہے جکد گرم اور شک ہوا ڈن سے بھی محفوظ رکھتا ہے۔ آم کے کا شتکا رآم کے باغات کو کورے سے بچانے کے لئے فاسلوری والی کھاروں سنگل سیر فاسفیٹ جساب 4 تا 6 کلوگرام پاٹر مل سیر فاسفیٹ 1 تا2 کلوگرام ہلجا طاعمر نی یودا ڈالیں اور پیاش والی کھار ہجساب2 کلوگرام فی یودا ڈالیس شیشم ،آم ہٹہتو ت اورزیتون کے لیے جلے درختوں کی ہا ژس بہت ضروری ہیں ۔ اُنہیں ہا غلاظ نے سے دوشتن سال بہلے لگا ئیں ۔ زما د دشتذک والے علاقوں یتنی پوتھوا رہا راولیندی ڈویژن میں تر شادیچلوں کے پوروں کو پہلےا کیہ دوسال کورے سے بچانے کیلیے ڈھانچا ضروری ہے۔ باغرا نوں کو جاہتے کہ ریڈ پو سے نشر ہو ن والی موسیاتی ر پورٹ سے آگا در ہیں تا کہ قبل از وفت کورے سے بیما ور کیلیج عفائلتی اقد اما ت کئے جا کی شمر آور با خات میں میڈی فصل (inter cropping) بالکل کا شت نہیں کر ٹی جائے ۔ کیونکہ دن کے وقت وہ زیٹن کو 7را رت جذب کرنے نہیں دیہتیںا ور دوسر ے کہر کی راتوں کو فضائی رطوبت میں اضافہ کرتی ہیں ۔ کہر کی متوقع راتوں میں ا آ بیاشی شرر کریں _ پھول نگٹے سے سلے موسم مہاریں یودوں پر سردی سے متاثر ہٹا خوں کوکا ہے دیا جائے اورزخموں پر بورڈ ویپیٹ لگائی جائے۔ مضمون کے ماخذ:

" Monthly Zarat Nama, Agriculture Department Govt of Punjab for the period 15-31 Dec, 2012.