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The Canadian Agriculture Weather Prognosticator

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World Weather At A Glance

- Southern Brazil and eastern Argentina weather is being influenced by La Nina resulting in below average rainfall. The trend will continue throughout December eventually leading to some crop stress
- Eastern Australia went through a recent bout of excessive moisture hurting unharvested wheat, barley and canola quality, but weather conditions have since improved
- Southern India was too wet in November hurting some crop quality and delaying harvest progress. Weather conditions are now improving
- U.S. hard red winter wheat production areas are still dealing with dryness and no change is expected this month
- Russia and Europe winter crops are favorably established
- Turkey rainfall has been beneficial recently

Good News Is Brewing For 2022 Weather

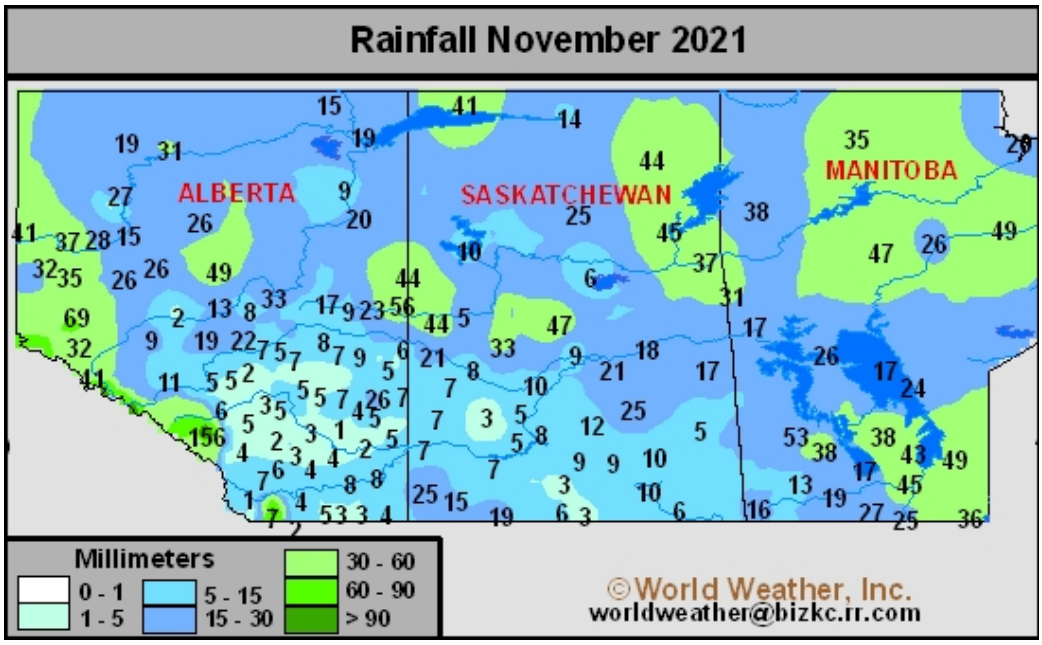
A huge part of western North America is still drought ridden, but weather in October and November whittled away at some of the dryness in the eastern Prairies and northern U.S. Plains. World Weather, Inc. views the change as a foreshadow of things to come in the next few months—mostly in the spring and summer, though.

Unfortunately, for eastern and southern Alberta and western and central Saskatchewan relief from dryness was minimal during the autumn if there was any. Drought remains quite serious in these areas and without some timely late winter and early spring precipitation the 2022 crops may not get planted or could fail after being planted.

All of the moisture that fell this autumn was welcome and it helped improve soil moisture in parts of Manitoba and some eastern Saskatchewan locations. Moisture in western and northern Alberta was still favorably rated, but most other areas were quite dry when November came to an end.

Intensive research over the 2022 growing season has been proceeding in recent weeks and confidence is rising over a better year with many of the worst drought impacted areas likely to get some needed moisture during the growing season. Early indications suggest southern and eastern Alberta rainfall will begin improving in May and frequent rain may occur during the summer in a part of the old driest areas in the Prairies.

There is still some concern about the start of the growing season, though. Winter snowpack will be significant in southern Alberta and along the Front Range of Mountains in southwestern Alberta as well as in a few areas in far southwestern Sas-



Good News Is Brewing For 2022 Weather (continued from page 1)

katchewan. Snow cover elsewhere in the Prairies should be greater than last winter (which is not saying much), but not likely to change soil moisture much because of frost in the ground. Spring snow melt will moisten up the top inch or two of soil, but it probably will not do much for moisture down deep in the ground. To fix those deficits rain will have to occur frequently and abundantly during the warm season and there is some potential for that.

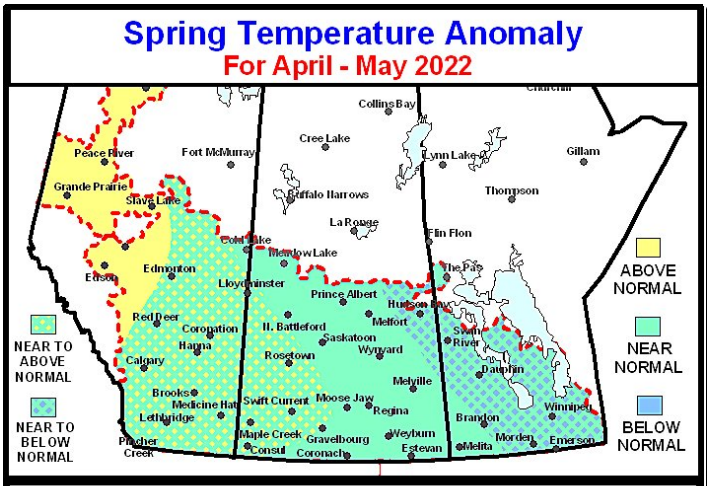
Most likely early spring will be a little too dry and a little cool which may raise some concern over planting prospects because of drought already present and the lack of moisture in some areas at the start of the growing season. This will be a problem in eastern and interior southern Alberta and in much of Saskatchewan, but by late spring there should be a sufficient amount of rain to help ease dryness and get crops developing well.

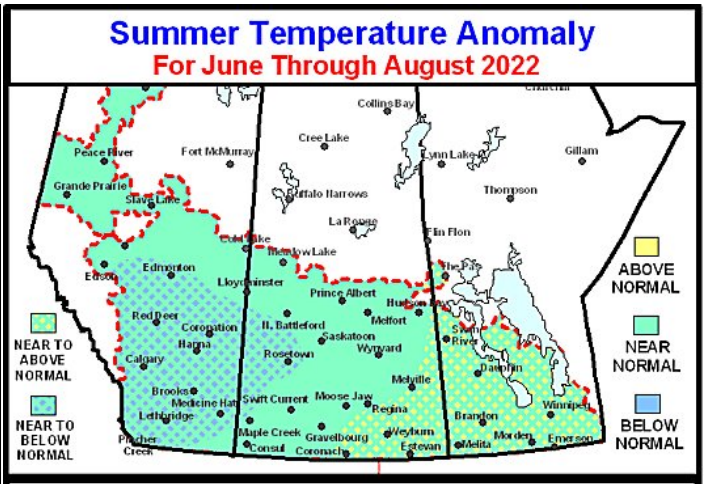
Late summer should be wet across the middle two-thirds of the Prairies, but southeastern and far northwestern parts of the region may trend a little dry once again. Hopefully, Manitoba will have received enough moisture in the spring to carry crops into the drier and warmer days of summer.

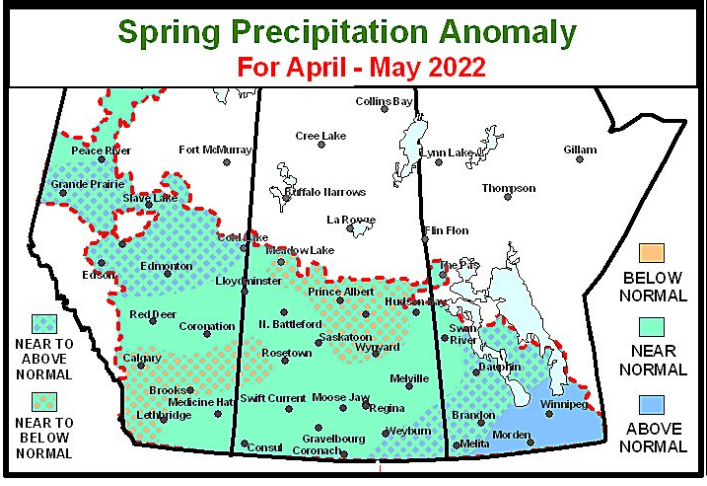
There are a number of factors that are going into this spring and summer weather outlook that could change in the next few months and leave a larger part of the Prairies in a drier bias. By no means, is this forecast ready to be set in stone, but World Weather, Inc. likes some of the signals showing up in the data and after a rough start in the spring conditions may get better for quite a few areas. However, an earlier than usual ridge of high pressure is expected to build into the U.S. Plains during early spring and by mid-spring it may be drying out the U.S. central and southern Plains while allowing storm systems into the Prairies.

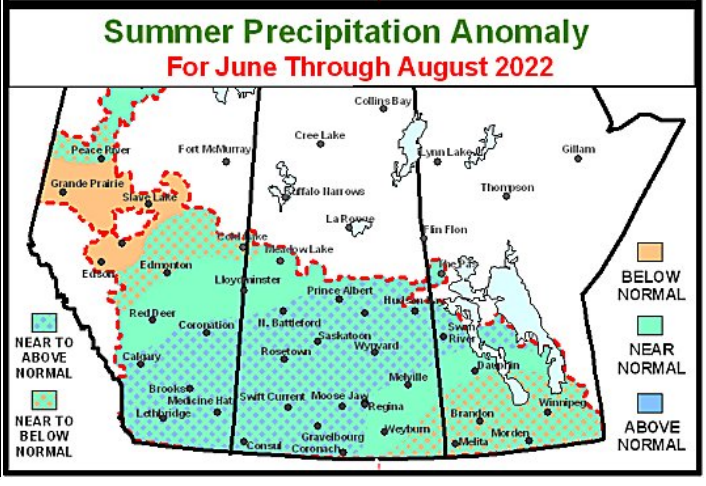
The high pressure ridge in mid-spring will have an opportunity to build strongly across the central United States during late spring and early summer in the western Corn Belt and Great Plains. The ridge amplitude will determine how much of the Prairies will get additional rain during the summer and who will dry back down again.

Early indications suggest that Manitoba and southeastern Saskatchewan could fall beneath the ridge of high pressure and see mid– to late-summer rainfall trail off and temperatures trend warmer. If that happens some moisture stress could return to the southeastern Prairies.









Winter Weather Will Not Provide Much Moisture

December temperatures will bounce around for a while, but at the end of December there is likely to be a new surge of cold air. The cold surge could be a little longer lasting with waves of arctic air expected for a period of ten days possibly. Warming may not come very quickly, but there will be some short term bouts of warmer weather.

The contrast in airmass temperatures and frequent succession of cold weather will induce some snowfall, but the moisture content in the snow will be low with one primary exception in the southwest.

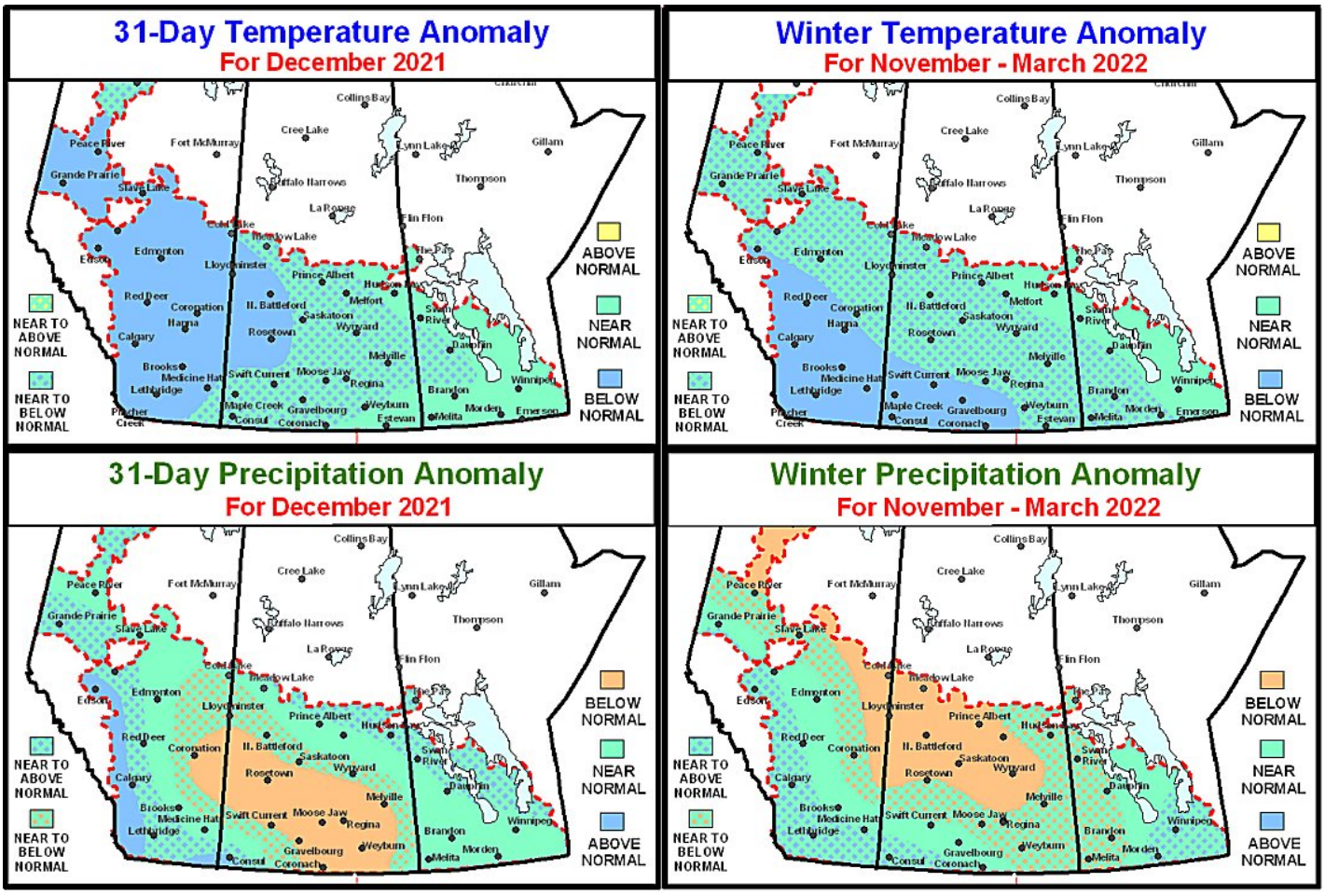
Areas along the front range of the Rocky Mountains in southwestern Alberta will experience a greater than usual amount of moisture during December. Some of that moisture will also occur near and south of Highway one in Alberta and from the Cyprus Hills region east a short distance into southwestern Saskatchewan. The snow will be welcome and may occasionally melt away during the winter, but cool temperatures will occur through most of the winter season and that may keep frost in the ground limiting the amount of moisture improvement occurs in the topsoil until after the spring thaw.

Both December and the entire winter will have a below average precipitation bias in the heart of the Prairies. This will include much of Saskatchewan, including some of the driest areas in the Prairies. Below average precipitation in these areas will leave the ground critically dry in the spring. Producers will have to watch for timely spring precipitation events to get their crops planted.

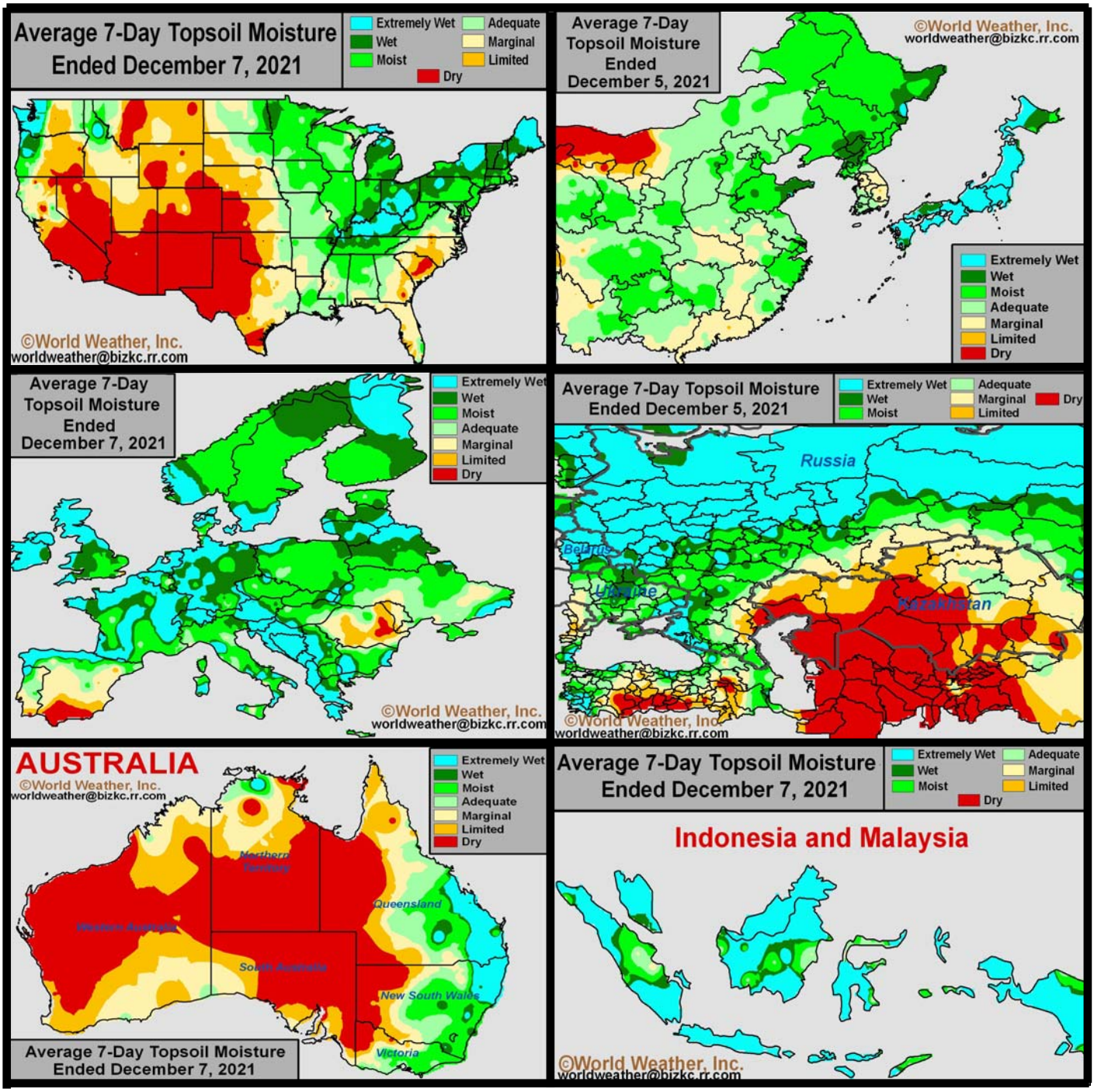
Manitoba will receive a little more winter precipitation than Saskatchewan, although the wetter bias is most likely in the southeastern part of the Province leaving western areas in need of greater precipitation.

Alberta's far west, including the Peace River Region will experience a cool winter bias this year. Precipitation is expected to be near to above average in December and then a little drier than usual for the winter as a whole.

Despite a few bouts of bitter cold air this winter, temperatures in the Prairies are unlikely to be far enough below normal on a persistent basis to drop readings well below average for the season. There is a little concern for the drier areas in Saskatchewan and Alberta, though. Low humidity in the atmosphere will help temperatures rise and fall more aggressively bringing some notable warm and cold to the region occasionally.



Selected Weather Images From Around The World



U.S. soil moisture is greatest in the Midwest and Delta where adequate to surplus moisture is common. The southeastern states and most of the central and southern Plains have been drying out and will continue to do that for a while. California and the far western states are about to receive some significant rain and mountain snow. Europe's only dryness appears to be in Romania, Spain and a few Ukraine locations. Soil moisture elsewhere is still very good. Soil moisture in much of western Russia, Ukraine, the Baltic States and Belarus has been slowly improving this autumn and the trend will continue into winter. The only area of concern in the CIS is northern Kazakhstan and southern Russia's New Lands where dryness may be an issue in the summer of 2022. Southeast Asia oil palm, rice, sugarcane, citrus, coffee, cocoa and other crops in Indonesia are doing well. Eastern Australia is beginning to dry down after too much rain in November hurt the quality of unharvested grain and oilseeds. More rain is expected.

Drought Recovery Stalls For Winter In Eastern Prairies

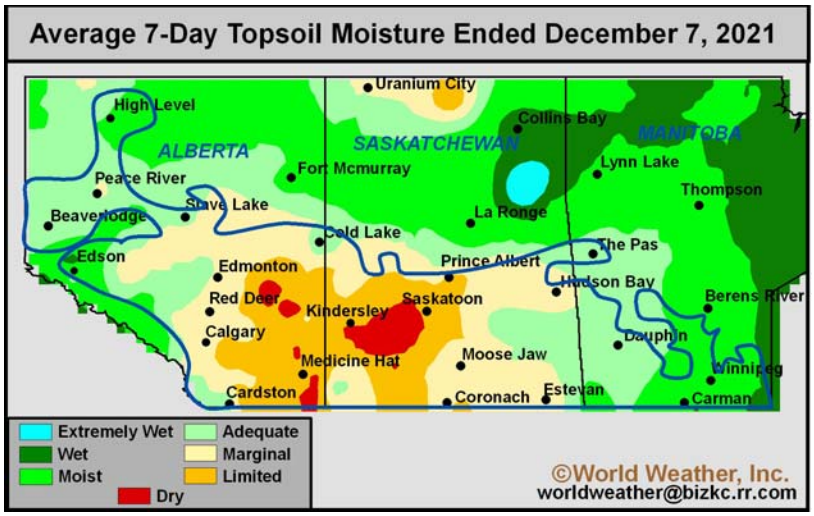
Significant snow and rain fell in portions of the eastern Canada Prairies during the past two months. The precipitation occurred in a few short episodes and may have been more of a fluke than an actual break in the drought, but producers will take moisture any way they can get it.

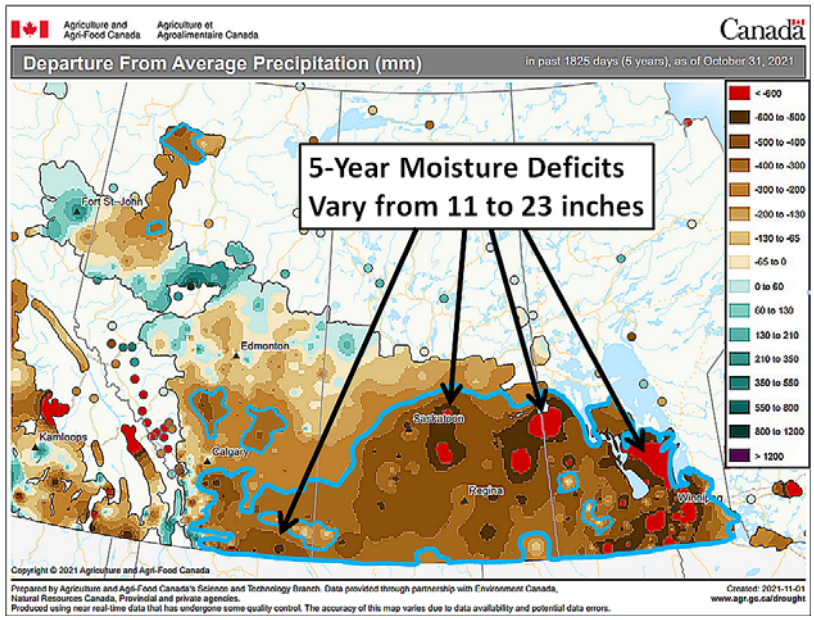
Moisture deficits in the Prairies have been at a staggering 11 to 23 inches over the past five years. Now, that is not how much moisture is needed to grow a crop in 2022, but it does illustrate the depth, breadth and duration of this drought. The best news that can be given to the Prairies producers in this situation is; 1) the Prairies really cannot get any drier than they have been, 2) the storms of October and November clearly demonstrated the atmosphere's ability to generate moisture and energy for significant precipitation, 3) the 18-year cycle for summer 2022 shows an opportunity for more frequent storms and more routine rainfall in at least portions of the most seriously drought stricken region, 4) strongly negative PDO (Pacific Decadal Oscillation) during the late spring or summer will push the high pressure ridge far enough to the east that storms and moisture will move up through the Rocky Mountains and into the heart of the Prairies from the southwest and 5) temperatures will not be as hot as last year in the western half of the Prairies, but summer heat may bubble up briefly in Manitoba and eastern Saskatchewan at times.

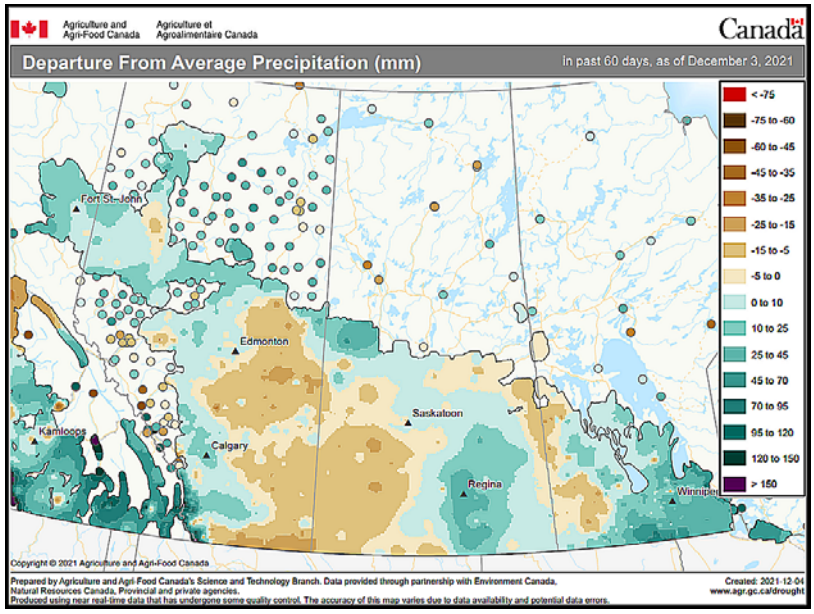
Unfortunately, winter has arrived and the jet stream is expected to be well to the south of Canada's Prairies for the next few months limiting the potential for serious changes in the moisture deficits, but the spring weather pattern changes anticipated should provide a new opportunity for relief.

Some patience will be warranted for those in dire need of moisture in the spring. The situation could look a little desperate for a little while, but the moisture should eventually come with the greatest volumes of it developing late in the spring and more likely during summer.

Ridge building in the eastern Prairies during summer could pose a set back to the recovery, but it will be hoped for that spring precipitation will be great enough for crops to coast into the drier and warmer period with a little cushion of moisture to carry crop development for a while. Research for 2022 weather will be ongoing for the next few months, so, stay tuned….

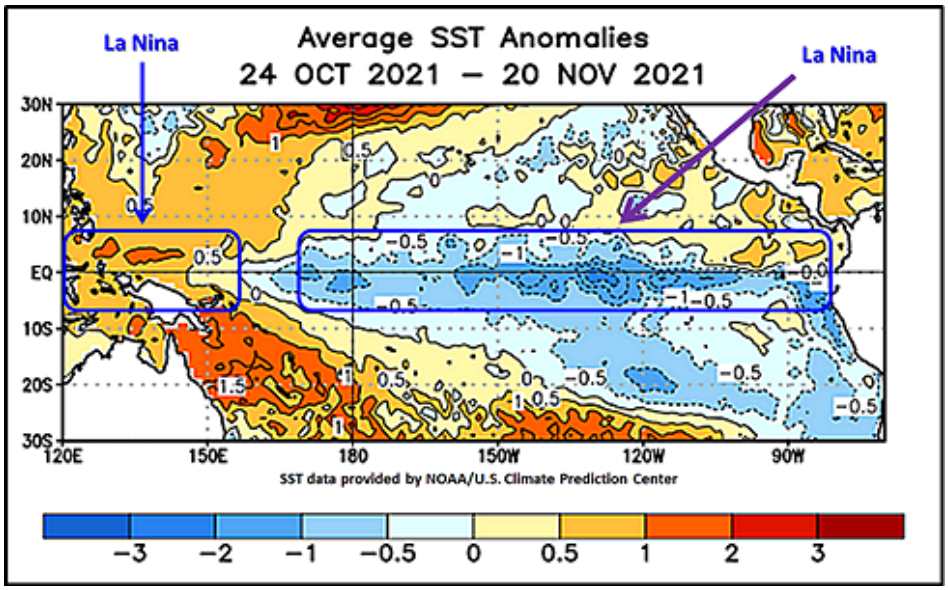






La Nina Still Has Potential To Extend Into Spring 2022

Despite favorable crop development conditions in South America, the current La Nina is considered to be a "traditional" event in the sense that its influence around the world is typical with long term averages. La Nina is in the midst of its second year of existence after beginning during the middle part of 2020. Most computer forecast models have suggested the event will last through the first quarter of 2022. Weakening during the Northern Hemisphere winter will be very important for spring weather in 2022. There is potential this La Nina event might linger a little longer and if it does it may contribute to some heightened potential for another year of drought in North America. This time the drought could impact more of the U.S. crop region and less of Canada.



Multi-year La Nina events in North America are clustered near and after solar cycle minimums. There is a tendency for La Nina events of two years or more to occur during and shortly after the solar minimum. The longer La Nina events prevail the more moisture gets removed from the middle latitudes of this planet. At the same time, La Nina events do bring greater precipitation to the tropics. These tendencies have already been noted in this current episode with dryness last summer in parts of Russia, Canada and the western United States partially occurring as a result of La Nina.

La Nina's interaction with the 22-year solar cycle and Pacific Decadal Oscillation helped make this past summer's weather a little extreme in a few areas. Similar biases have occurred in the past. Despite a media tendency to make recent abnormal weather the byproduct of climate change, the reality is in the mix of weather cycles like La Nina, the solar cycle and the negative phase of Pacific Decadal Oscillation. The simultaneous occurrence of these patterns can often produce some wild extremes. The warmer planet we live on is certainly playing a role in the resulting weather, but it is not the cause.

The 22-year solar cycle has a notable footprint with weather extremes often occurring after the 22-year solar minimum has occurred and prior to the solar maximum. It is during this period of time that multi-year La Nina events often occur and World Weather, Inc. believes the weather extremes that occur in this part of the solar cycle often are more extreme than at other points in the cycle.

La Nina events rarely last more 18 months, but whenever they last longer it is nearly always because of the simultaneous occurrence of the passing solar minimum. The 22-year solar cycle seems to generate the most significant droughts that impact North America and sometimes parts of Russia. These are usually multi-year droughts and are often more intense than the droughts that occur in the 11-year solar cycle.

Looking back at history there has been a tendency for the most serious droughts to be associated with this 22-year solar cycle and they seem to occur while La Nina is prevailing for more than two years and Pacific Decadal Oscillation trends more negative. The droughts of the 1930s, 1950s, 1970s and early 2000s were all a part of the same 22-year solar cycle that we are in today. Each of those multi-year droughts also occurred with a prolonged La Nina event.

Now, the drought of 2012 was not a part of this same solar cycle, but it did occur in association with a La Nina that almost lasted two years and there was a brief bout of strongly negative PDO as well. The difference in the two solar cycles seems to be in the duration and intensity of droughts in North America. The 2012 event was mostly a single year event, although it started in 2011 in the southern Plains and it took a while in 2013 for the event to fully break down. There have been other droughts of significance in that same solar cycle including the 1986-89 drought years, so it is important to note that this current 22-year solar cycle is not an exclusive multi-year drought maker, but some of the more dramatic long lasting droughts in history seem to occur in this part of the solar cycle rather than in that which was associated with the drought of 2012.

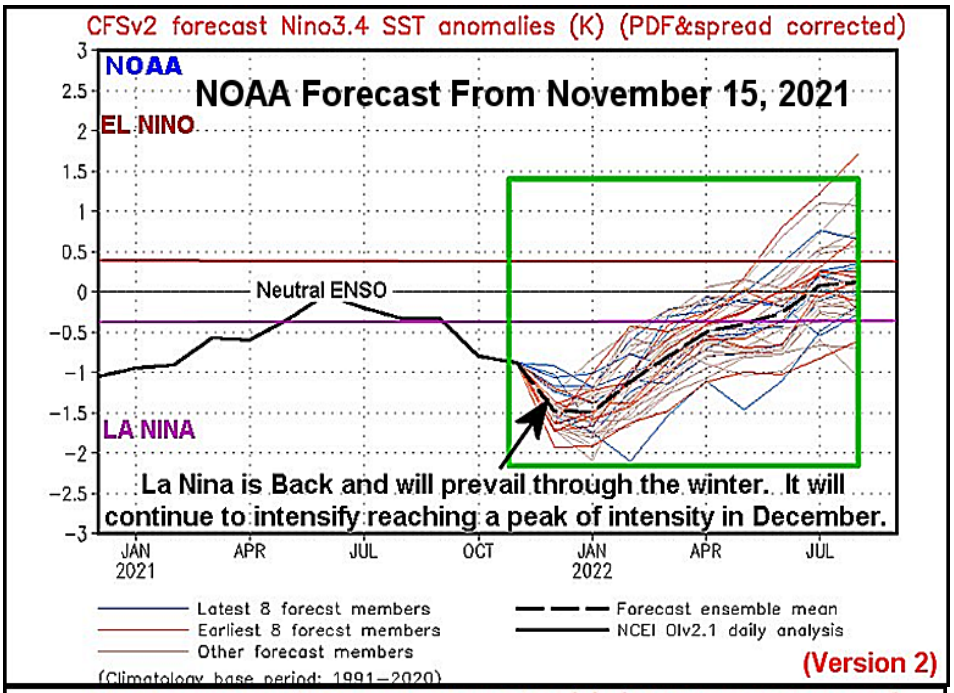
La Nina May Extend Into Spring 2022 (Continued From Page 6)

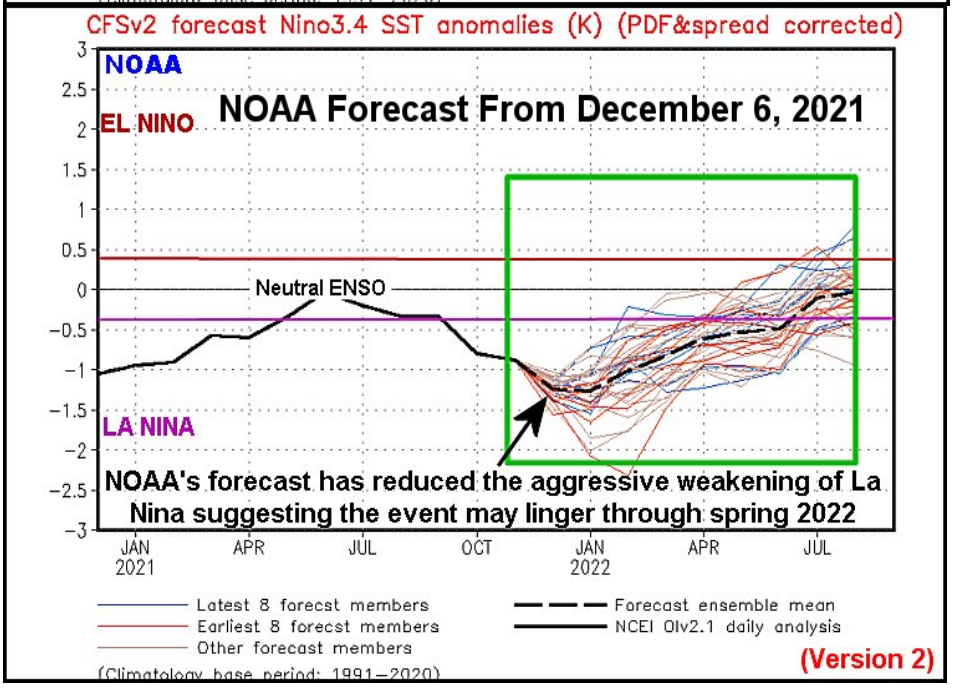
Looking at past La Nina events that have occurred in this same 22-year solar cycle, we noted that the events lasted 29-36 months. The La Nina event of the 1950s lasted 29 months and the Pacific Decadal Oscillation was the most negative ever reported since 1900 on a persistent basis with some values below -3. The La Nina event of the 1970s lasted 36 months (3 full years) while that of the 1998-2001 lasted 32 months. In each of these events there was a brief break of La Nina that lasted just a few months mid-way through the event similar to that which occurred briefly last summer.

The current La Nina event is in its 17th month of existence with a brief break during the summer. If this La Nina event only lasts as long as that of the 1950s there is potential that it could linger through the spring and summer of 2022. Even if this La Nina only lasts 23 months like that of 2010-12, that suggests this La Nina could continue into June of 2022. Of course no one has accurately predicted the duration of a La Nina event this far in advance so a little patience is warranted. However, with that said, you should be aware that NOAA's recent forecasts for La Nina have backed off of the quick weakening trend suggested a couple of weeks ago to a much slower demise of raising the potential that it will last longer than previously thought

The longer La Nina lasts the more moisture can be removed from the middle latitudes and the greater the potential is for another year of drought in North America during 2022. The combination of prevailing La Nina and negative Pacific Decadal Oscillation will be enough to induce a stronger ridge of high pressure in the middle of the United States during the spring and summer resulting in more dryness and a threat to 2022 production in a part of the Plains and western Corn Belt.

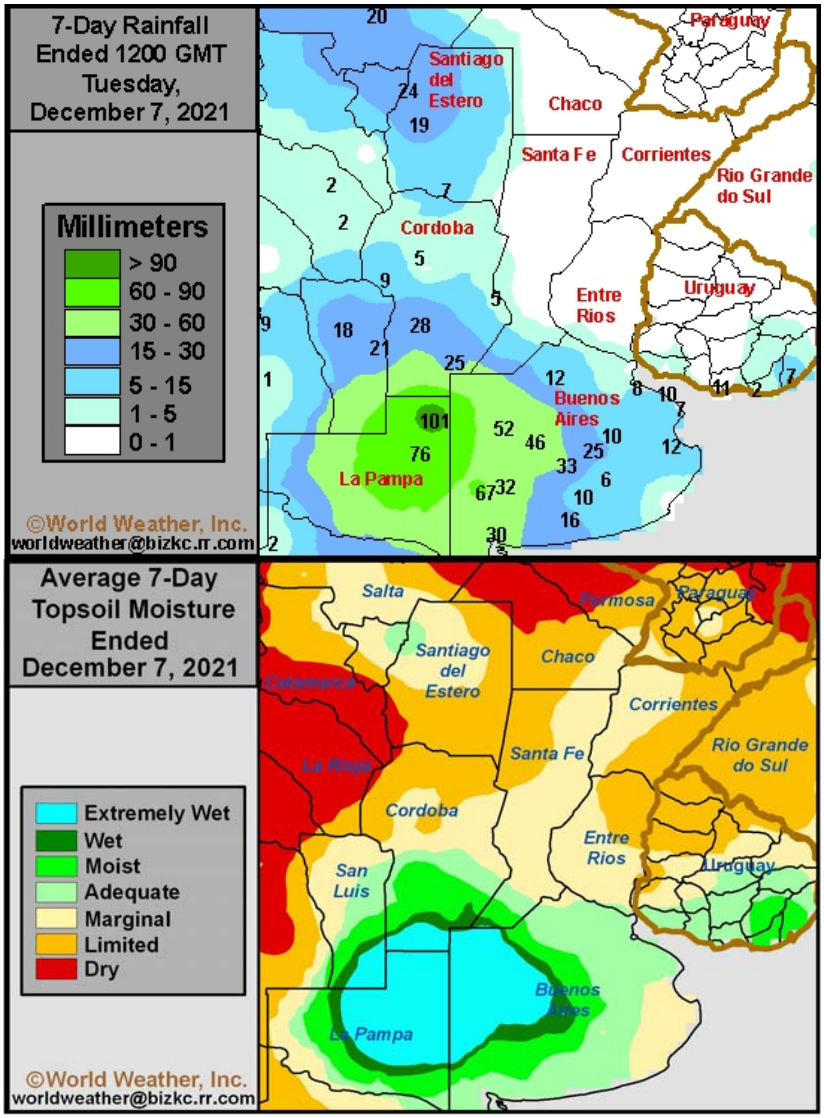
It is too soon to get too specific about 2022, but with drought already in place and the potential for La Nina to last longer while in the 22-year solar cycle and negative PDO is in place the potential for another year of drought farther east than in 2021 is relatively good.





Timely Argentina Rain Has Crops Better Than 2020

La Pampa, southern Cordoba and western Buenos Aires reported welcome rain during the past week that significantly improved topsoil moisture. Other areas in the nation experienced net drying, but subsoil moisture was still supporting crops in a better manner than last year at this time. Coarse grain and oilseed crop conditions improved after many areas were struggling with dryness earlier in the planting season. Argentina will see a mix of spotty rain and sunshine during the coming week that will not offer much relief to the driest locations. Cordoba will be wettest in this coming week while eastern parts of the nation dry down raising the need for more timely rain to protect production potentials.



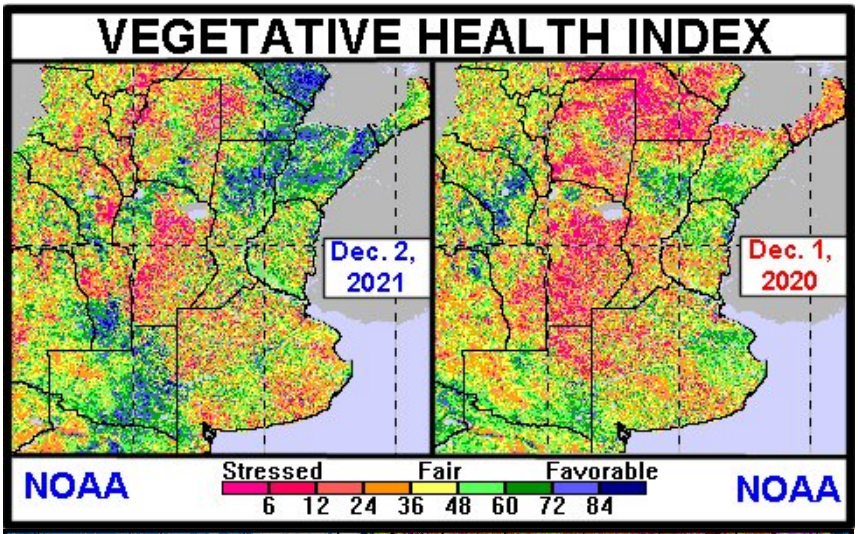
Recent rainfall was enough to bring topsoil moisture to adequate or excessive levels in La Pampa and western Buenos Aires. The remaining portions of Buenos Aires into southern Cordoba generally have adequate amounts of moisture in the topsoil as well. Topsoil moisture in the remainder of Argentina was rated short to very short while subsoil moisture throughout the nation was rated marginally adequate to adequate. Most of the nation's crop areas were not dry enough to threaten a fall in production potential; however, declining moisture in the north may lead to a little crop moisture stress soon if not relieved.

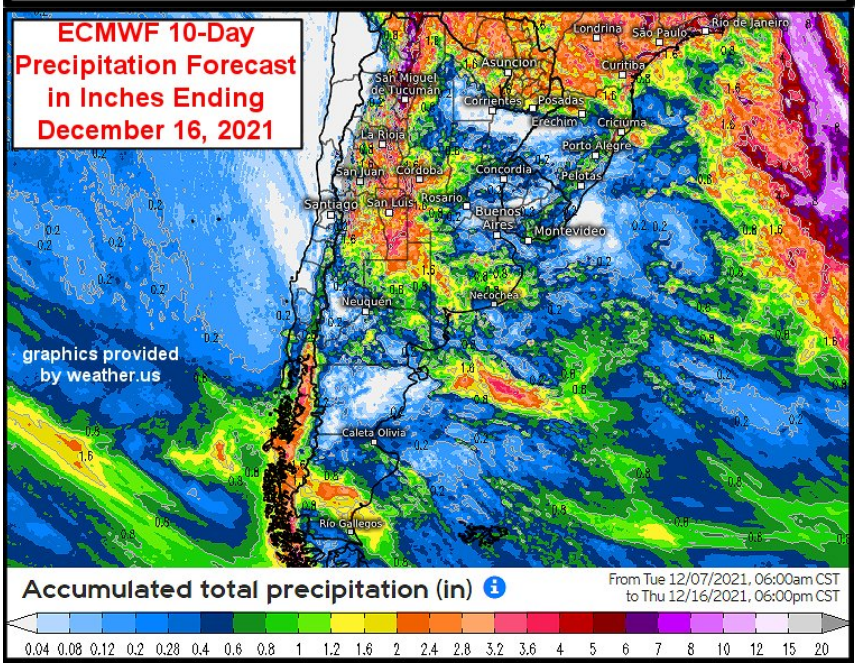
As of December 2, cotton planting was 51% done compared to 46% last year and both rice and sunseed planting were complete. Corn planting was 56% done while, peanuts, soybeans and sorghum were 89%, 50% and 44% planted respectively, which was slightly ahead of last year except in soybean areas where it was 3 percentage points slower than last year. Wheat harvesting was 44% done compared to 42% last year and barley harvesting was 13% done up from 5% last year.

Crop conditions, according to satellite imagery and the Vegetative Health Index developed by the U.S. National Oceanic and Atmospheric Administration (NOAA) are rated more favorably this year than last year. A tremendous improvement in the general health of crops in northeastern Argentina has occurred because of recent rainfall and favorable soil moisture. Much of east-central Argentina is also experiencing a little better crop development than a year ago, but a few areas in Cordoba and some in Buenos Aires may be in the same shape as they were last year and that means a boost in rainfall might be needed. Indexed images below are reflective of conditions last week and recent rain should have brought on some additional improvement to crops in southern Cordoba, western Buenos Aires and La Pampa. Overall, the bottom line, remains favorable for most of Argentina, although because of low topsoil moisture it will be imperative that timely rain falls soon to protect production potentials later this month.

Argentina Crops Better Than 2020 (Continued From Page 8)

Despite a mostly good environment for crop development in Argentina recently, it will be quite important for timely rainfall to continue because of the ongoing La Nina event. La Nina has a tendency to reduce summer precipitation in eastern Argentina, Uruguay, southern Brazil and southern Paraguay. If this summer's La Nina behaves normally these eastern crop areas of Argentina will struggle with dryness and rain is needed now as well as over the balance of this month to stave off a more significant bout of crop stress due to building dryness.





Many areas in Argentina will receive less than usual rainfall during the coming week to ten days. A disturbance will still generate scattered showers when tracking across the region Wednesday into Friday. A weak frontal boundary will also promote erratic rainfall this weekend into early next week. Cordoba and portions of Buenos Aires and Santiago del Estero will receive 0.50 to 1.50 inches of rain by next Tuesday morning. Pockets in Cordoba could receive more than 2.00 inches of rain as well. The remaining areas will receive 0.10 to 0.75 inch of rain with drier pockets in Entre Rios, Corrientes, Chaco, and Formosa. Precipitation may again be limited December 15-21.

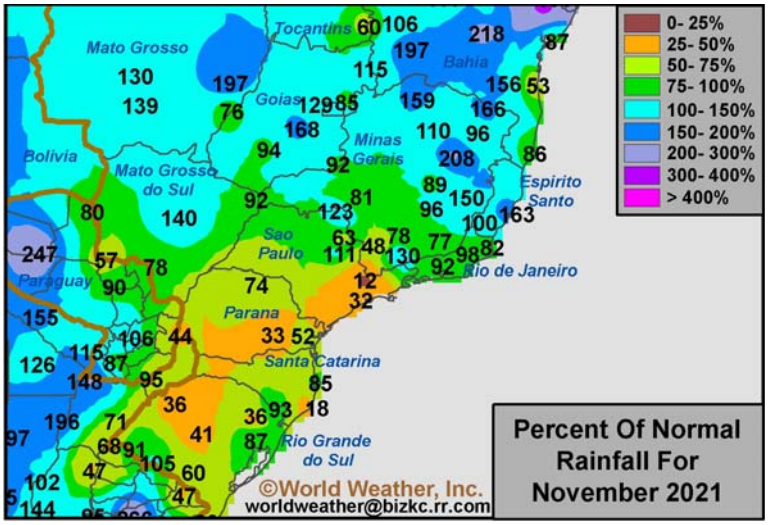
Temperatures will be near normal with daytime highs often peaking in the 80s and lower 90s. Portions of northern Argentina will warm to the upper 90s at times while pockets in central and southern Argentina only warm to the 70s later this week and weekend. Low temperatures will be in the 50s and 60s with pockets in the south cooling to the 40s.

The ground will slowly dry in a large section of Argentina during the next two weeks. La Pampa and western Buenos Aires will still have plenty of moisture to support aggressive establishment and growth despite the gradual drying trend. Cordoba will also receive enough rain to promote generally favorable short-term conditions, though additional rain would still be ideal. Santa Fe, Entre Rios, Santiago del Estero, and the remaining portions of Buenos Aires may continue to dry down with some crop moisture stress expected especially next week when the topsoil moisture is lowest and temperatures are warmest. Crops may establish unevenly in the driest fields and development may also become sluggish late in the month if dryness persists. Overall, while conditions for the short-term will be relatively good outside portions of Santa Fe and Santiago del Estero, long-term dryness will remain a concern later in the growing season as La Nina continues to limit rainfall at times.

Southern Brazil, Neighboring Areas Drier Biased

A lack of rain and warm weather during the past week firmed the ground in western sections of Rio Grande do Sul, Santa Catarina, and Parana into southern Mato Grosso do Sul. Many of these areas have short to very short topsoil moisture with adequate amounts of moisture still in the subsoil. The moisture profile in most other production areas is adequate to excessive.

Southern Brazil and a large portion of Sao Paulo and southern Mato Grosso do Sul received less than usual rain during November. These areas only received 32-93% of normal rainfall for the month, though pockets in Sao Paulo and southern Rio Grande do Sul were slightly wetter than normal. Southern Minas Gerais also received near to below normal rainfall ranging from 48-96%. The remaining production areas in Brazil received near to above normal precipitation.



Soybean and first season corn conditions are variable in far southern Brazil and portions of both Sao Paulo and southern Mato Grosso do Sul. Areas closest to the Argentina and Paraguay border have dried significantly recently, slowing crop development, but inducing no permanent harm to production. Concern over the potential for some yield decline this summer remains because of prevailing La Nina conditions which usually allow below average precipitation and warm temperatures to fester long enough to cut into yield potentials. Not only could soybean and first season corn production take a hit due to dryness, but there may not be enough moisture for Safrinha corn planting in January and February if dryness prevails too long. There is still time for rain to improve the outlook for the region in coming weeks and a close monitoring of the situation is warranted.

The remaining production areas in center-south, center-west, and northeastern Brazil have plenty of moisture to support aggressive soybean and first season corn establishment and growth. Planting should wrap up in coming weeks. The outlook for these areas is more favorable compared to far southern Brazil due to timely rain earlier this growing season and periodically through the end of December and into January.

Southern Brazil into southern Mato Grosso do Sul and much of western and southern Sao Paulo will again be drier biased into Friday of this week. Brief periods of light rain will occur at times this weekend and next week. A few locations in eastern sections of Rio Grande do Sul, Santa Catarina, and Parana will receive 0.50 to 1.50 inches of rain and locally more by next Monday morning. However, most locations will not receive enough rain to counter evaporation or impact long-term soil conditions. Parana, southern Mato Grosso do Sul, and western and southern Sao Paulo may see precipitation potentials increase December 14-20 while Rio Grande do Sul and Santa Catarina remain drier biased.

Additional drying is slated for far southern Brazil, southern Mato Grosso do Sul, and much of western and southern Sao Paulo this week. Topsoil moisture will likely become short to very short for most locations. Planting and general fieldwork will advance swiftly due to the lack of rain. Soybean and first season corn establishment and growth conditions will otherwise deteriorate. Rainfall during the second week of the outlook could marginally improve growth prospects in Parana, southern Mato Grosso do Sul, and western and southern Sao Paulo. However, more rain will be needed to completely fix moisture deficits. Continued dryness in southern Rio Grande do Sul and Santa Catarina will otherwise increase concerns over production losses.

The remaining portions of Brazil will see a good mix of rain and sunshine this week. Minas Gerais, Bahia, and Espirito Santo will receive some of the most significant rain with totals ranging from 2.00 to 6.00 inches and locally greater amounts to 8.00 inches or more by next Monday resulting in some flooding. Most other locations will receive 1.00 to 4.00 inches of rain. Soil moisture will remain at adequate to excessive levels. The environment will remain favorable for aggressive soybean and first season corn establishment and growth.