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Full Length Research Paper

Effect of nitrogen fertilizer levels on different planting remobilization of dry matter of durum wheat varieties Seimareh

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The present work was carried out at the agriculture research center, Islamic Azad university of Ardabil branch, Iran, 2010 to 2011 cropping year using Seimareh durum wheat cultivars, arranged as factoriel based on randomized complete block design (RCBD). Different nitrogen fertilizer levels (check, 60, 80 and 120 kg/ha) and three planting times (23th October, 11th November and 2th December) with three replications were studied. Results showed that the yield was affected by fertilizer levels, planting dates and interaction between fertilizer levels and planting dates. Results of analysis of variance showed that the grain yield in this study in replication, planting dates, fertilizer levels and interaction between fertilizer levels and planting dates was significant at 0.01 percentage levels. For all traits control and 120 kg/ha^{-1} was the best level of fertilizer. Final results showed that the 120 kg/ha^{-1} and 11th November were the best level for Seimareh genotype in this study.

Key words: Ardabil, dry matter, durum wheat, nitrogen fertilizer, planting dates.

INTRODUCTION

For thousands of years, durum wheat (*Triticum turgidum, L.var.Durum Defs*) has been cultivated both irrigated and rain-fed in the west of Iran. Tetraploid durum wheat (*T. durum*) or hard wheats mainly are used to produce semolina flour used in the food industries especially pasta spaghetti. Considering that performance is a polygenic adjective and its heritability is high to achieve high yield, selection used by Performance components (Gholamin et al., 2010).

Planting date is one of the most important agronomic factors involved in producing high yielding small grain cereal crops, which affects the timing and duration of the vegetative and reproductive stages. In Egypt, wheat sowing dates varied among different location. The variation in sowing dates plays an important role in the variation of wheat yield per unit area. There are several studies that documented the effects of planting date on winter cereals (McLeod et al., 1992; Chen et al., 2003; Schwarte et al., 2005). Seeding earlier increases chances of disease and insect problems. Seeding later reduces chance of survival, generally delays maturity increases disease chances and reduces yield potential. A 34% decrease in grain yield occurred when planting was delayed from 22 September to 19 October in Nebraska, USA (Blue et al., 1990).

Sadeghzadeh (2002), Mahfoozi and alizadeh (2003), in study on wheat different planting dates in Iran reported that, if planning is not in proper form, the positive effects of planting alternative crops can no longer be timely.

Mahfouz (1992), in Egyptc reported that the highest value for plant height, number of tillers/m^2, number of spikelets/spike, spike length, number of grains /spike, 1000-grain weight, biological and grain yields were produced when wheat was sown on 15th November. But, the highest number of non effective tillers/m^2 and the highest straw yield were recorded from sowing wheat on 30th November. Wheat yield declined by 30 to 40% when

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seeding was delayed from early September to late October in SW Saskatchewan (McLeod et al., 1992).

Nitrogen is the most important plant nutrient needed to obtain high wheat yields in Iran. Mosalem (1993), Zahran and Moslem (1993), Darwiche (1994), Essa (1996) and Zahran et al. (1997) reported that plant height, flag leaf area, tillers number and dry weight per unit area of wheat were increased with increasing N level. Several investigators (Darwiche, 1994; Essa, 1996; Mostafa et al., 1997; Mosalem et al., 1997; Sorour et al., 1998; Sobh et al., 2000) reported a beneficial effect of nitrogen application on wheat. They reported that numbers of tillers and spikes/m^2, plant height, spike length, number of spike lets and grains/spike, grain and straw yields of wheat increased with increasing N level.

Photosynthetic products move from source to sink or source photosynthetic production and consumption on one side and the reservoir's capacity, if the imbalance between them decreases performance (Mahfoozi and Alizadeh, 2003).

Reallocation of stem reserves to grain stress by Palta et al. (1994) has also been reported. All vegetative organs in the course of their growth can act as a reservoir for storage of photosynthetic products. Przulj and Momcilovic, (2003) showed that during the experimental years in spring barley varieties, some figures in favorable conditions, the yield that would be produced, amount of dry matter from flowering to maturity themselves lose. This study to determine the most appropriate level of nitrogen fertilizer and planting date for the varieties of durum wheat was conducted in Ardabil.

MATERIALS AND METHODS

The present work was carried out at the agriculture research center, Islamic Azad university of Ardabil branch, Iran, in two (2010 to 2011) agricultural year using Seimareh durum wheat cultivars, arranged as factoriel based on randomized complete block design (RCBD). Different nitrogen fertilizer levels (0, 60, 80 and 120 kg/ha) and three planting times (23th Octobr, 11th November and 2th December) with three replications were studied.

Each plot was planted on five rows placed 300 cm apart. Upon the planting (for each time), irrigated was performed for whole blocks to moistent soil profile in the rhizosphere of all cultivars to facilitate germination. Irrigation was done as flooding at the harvest time, to prevent border effect, 50 cm of each row from both sides were eliminated to harvest and following traits were measured: plant height, total number of tillers, fertile tillers, main spike length, main spike weight, total plant dry weight, number of seed seeds per main spike and seed weight per main spike was measured.

One third of nitrogen fertilizer at planting time and the rest as the road in the spring and the on stem levels was used .To investigate the transfer of dry matter, remobilization of dry matter yield and the participation of stem reserves in grain yield. Transfer rate of dry matter of time before ear emergence to physiological maturity were measured. Plants harvested stem, leaves and seeds are separated and after drying (Dravn temperature 75℃ for 72 h or more until a constant weight), weighed, and the transfer rate between the DM and other attributes of the above is calculated (Niu et al., 1993).

Amount of transfer of dry matter to seeds (mg/plant) = the maximum amount of shoot dry matter (At First impressions) - Shoot dry matter (At maturity)

Process of remobilization of dry matter yield (Percent) = Amount of transfare of dry matter to seeds/Yield) ×100

Remobilization of stored from stalk to seed = Maximum shoot dry weight, after pollination - Shoot dry weight at maturity

Contribution of stem reserves in grain yield = (Remobilization of stored from stalk to seed/Yield) ×100

Data were subjected to analysis by MSTAT-C and SPSS-16 softwares, and graphs were prepared by Excel.

RESULTS AND DISCUSSION

Results showed that the yield was affected from fertilizer levels, planting dates and interaction between these two (Table 1). Results of analysis of variance showed that the grain yield in this study in replication, planting dates, fertilizer levels and interaction between fertilizer levels and planting dates was significant at 0.01 percentage levels. According to the mean compration for this trait (Figure 1), Downward trend in delays in planting, and the upward trend in nitrogen levels up to 120 kg/ha^{-1} and a reduction in the level of 180 kg/ha^{-1}respectively.

The participation of stem reserves in grain yield

Results of analysis of variance (Table 1) showed that, the effect of planting date at 0.05 percentage levels and effect of nitrogen fertilizerlevels at 0.01 percentage level were significant for the participation of stem reserves in grain yield. Results of mean compration of interaction between planting dates and fertilizer levels, Suggests increasing the participation of stem reserves in grain yield up to 120 kg/ha^{-1} of fertilizer on the first culture (11th November) respectively. And the level of 180 kg/ha^{-1} of fertilizer of on the third planting date (2nd Dec) was the lowest (Figure 2).

Uhart and Andrade (1995) argued that due to the physiological relationship between source and sink capacity of the reservoir is a source of irritation. In this study, the reduction of nitrogen fertilizer due to increased dry matter transfer from stem to seed, Contribution of stem reserves in grain yield is increased.

Hokmalipour (2006) and Hokmalipour et al. (2007), in their study also reported a similar trend.

Remobilization of dry matter to seed

Table 1 shows that between replication and fertilizer levels at 0.01 percentage level and planting dates at 0.05 percentage levels were significant difference.

Results of mean compration for remobilization of dry matter to seed (Figure 2), showed that the best planting date for this trait was 23th October also the best fertilizer

Table 1. Results of analysis of variance.

SOV	Df	MS				
		Yield	Remobilization of dry matter to seed	Remobilization of dry matter in yield	Re-transfer of materials from the stem to the seed	The participation of stem reserves in grain yield
Rep	2	38649.36**	50.46**	0.135	50.76**	5.371
Planting date	2	346376.44**	26.003*	28.65**	417.18**	11.34*
Fertilizer levels	3	3581912.03**	13343.56**	112.39**	3306.32**	36.501**
P×F	6	465515.59**	3.45	3.83**	19.45**	0.23
Error	18	7760.21	5.036	0.94	2.31	0.39
CV (%)	-	2.4	3.25	5.28	11.5	4.5

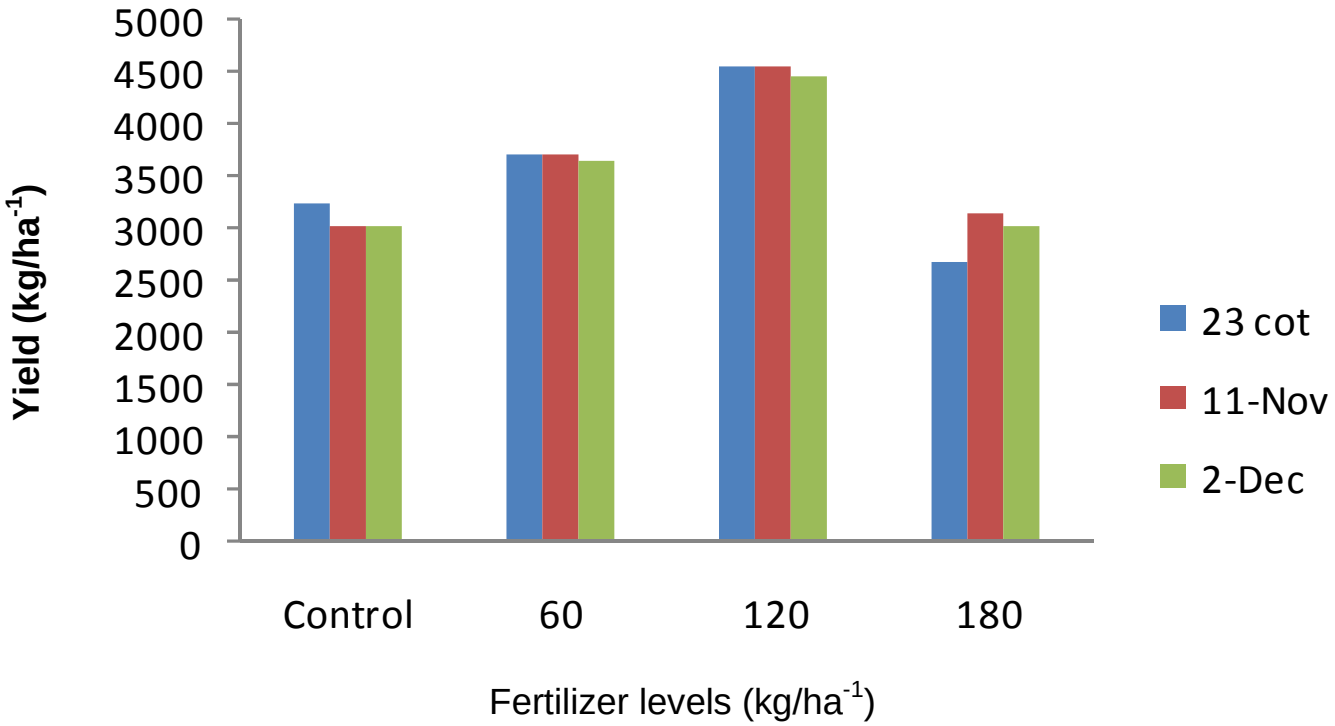

Figure 1. Interaction between planting dates and fertilizer levels for yield (significance 0.05 percantage levels).

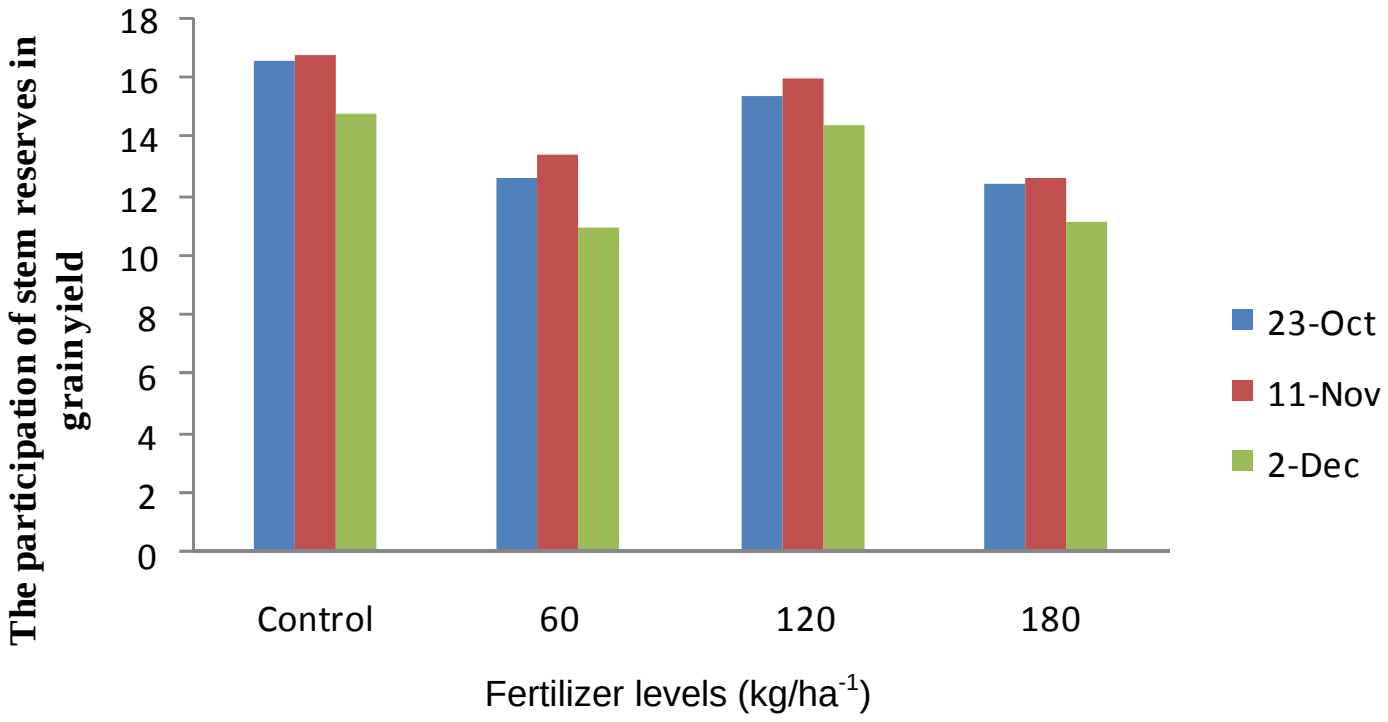

Figure 2. Interaction for the participation of stem reserves in grain yield (significance 0.05 percantage levels).

level was 120 kg/ha^{-1}. Moreover, with increasing levels of fertilizers (except the control) increased the rate of transfer of dry matter to seed.

Hokmalipour (2006) and Hokmalipour et al. (2007), in their study of the re-transfer reduction of total plant dry matter to grain density increased nitrogen levels have been reported.

Remobilization of dry matter in yield

The effect of planting date, fertilizer levels and interaction between these two for remobilization of dry matter in yield was significant at 0.01 percentage level (Table 1). Results showed that with increasing fertilizer levels, a rising trend in the amount of remobilization of dry matter in yield was observed. Also the delay on the culture's showed negative effect on the appropriate adjective (Figure 3).

Hokmalipour (2006) and Hokmalipour et al. (2007), in their study also reported a similar trend. Storage of materials prior to flowering in maize grain yield to 90 percent, and average between 20 and 40 percent has been reported (Rahimian and Zand, 1998).

Contributions of storage carbohydrates in the grain filling up to 50 percent by Yoshida (1972) have been reported.

Re-transfer of materials from the stem to the seed

Results of analysis of variance for re-transfer of materials from the stem to the seed showed that the effect of replications, planting dates, fertilizer levels and interaction between planting dates and fertilizer levels were significant at 0.01% levels (Table 1).

Mean compration for this trait, positive affect of compared to 120 kg/ha^{-1} of fertilizer and the crop showed a negative effect on the delay (Figure 4).

Hokmalipour (2006) and Hokmalipour et al. (2007), in their study of this material and reduce the transmission of the stem to grain, increased nitrogen levels have been reported. According to Figure 4, control the level of fertilizer treatment on the composition of twenty (November), highest and planting date at 2-Dec with180 kg/ha^{-1} had the lowest value of re-transfer of materials from the stem to the seed (Figure 4).

These findings and reports with Schussler and Westgate (1991) and Uhart and Andrade (1995), argue that resource constraints in the transmission of increased corn dry matter loss of stem and non-structural carbohydrates can shoot the match.

General conclusion and recommendations

In general it was observed that with increasing nitrogen

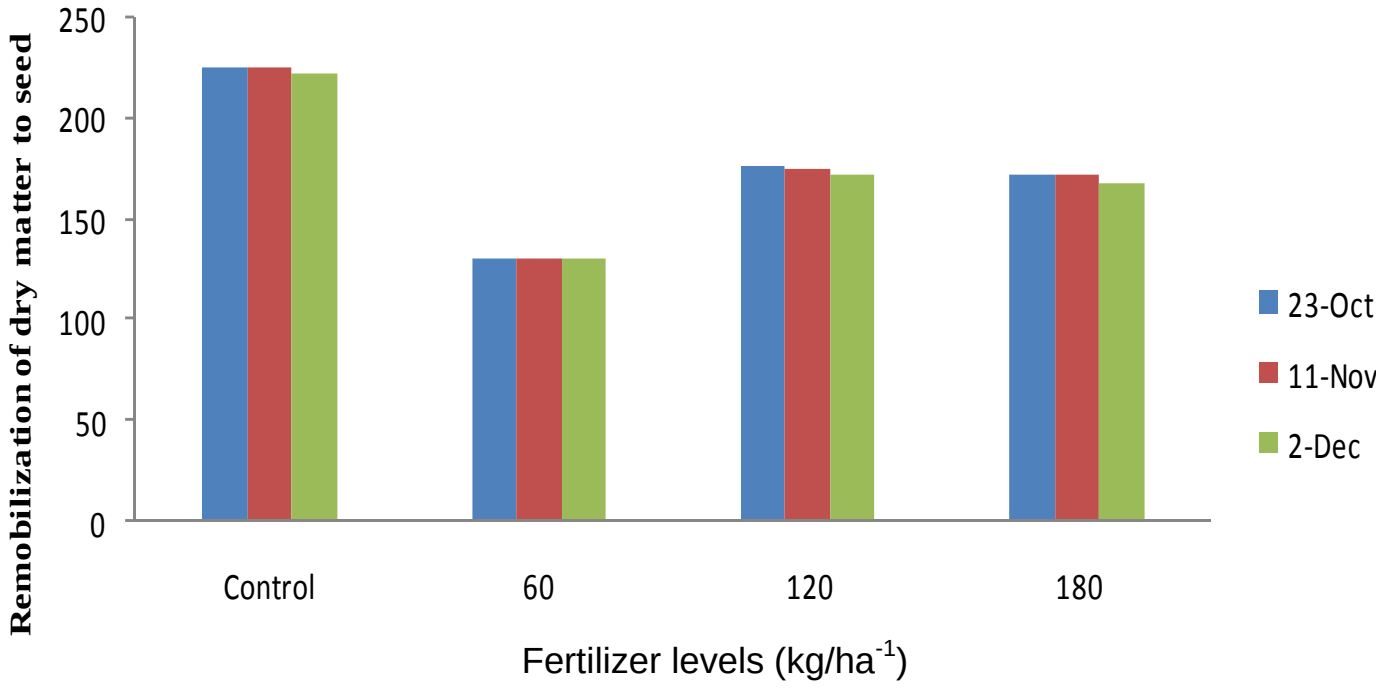

Figure 3. Interaction for remobilization of dry matter in yield.

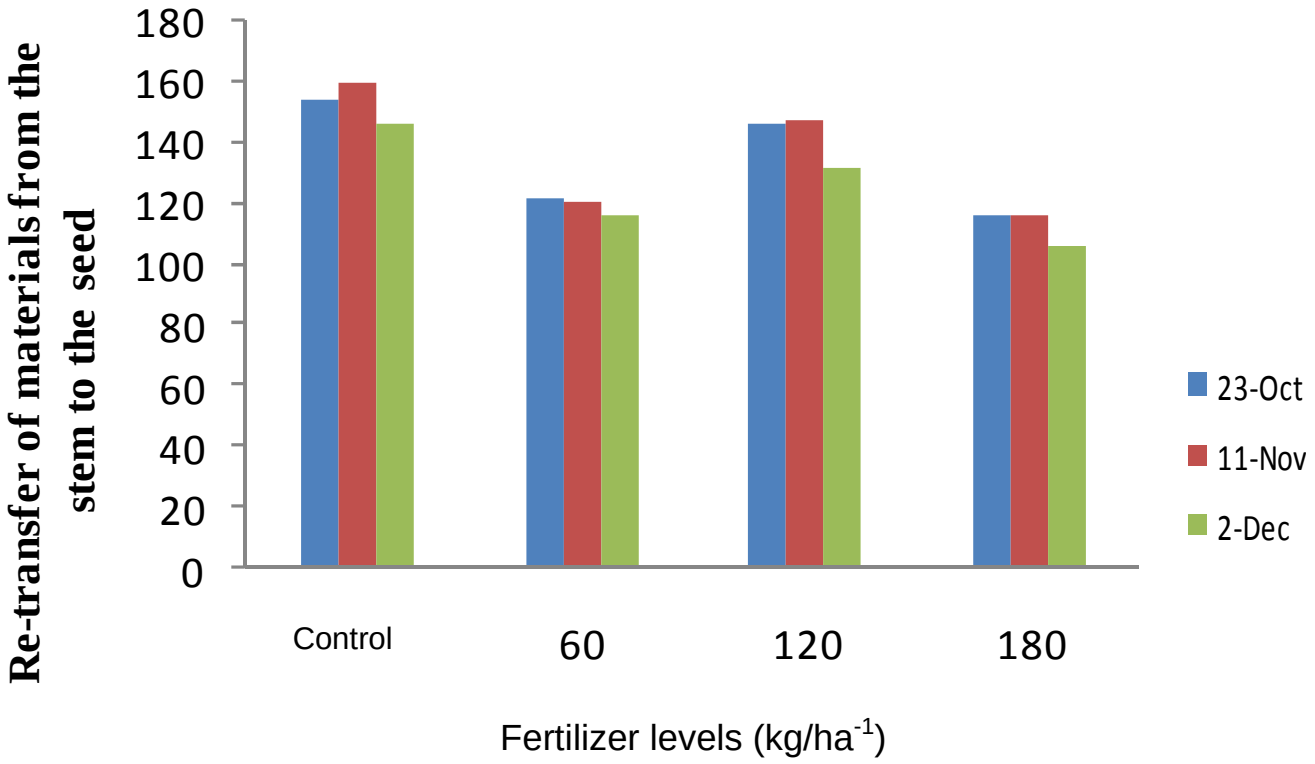

Figure 4. Interaction for re-transfer of materials from the stem to the seed (significance 0.05 percantage levels).

fertilizer, biological yield increased, and remobilization of dry matter to seeds and stems of the plant, the remobilization of dry matter and the participation of stem reserves in grain yield decreased.

Given that grain yield under the current process of photosynthesis and the transition from vegetative to seed biomass takes place and low levels of nitrogen and lower leaf surfaces, leading to a reduction in yield is now part of photosynthesis, In such cases the inability to offset the estimated target Is the origin of transmission through the dry ingredients to provide the required destination. Also, because the four traits measured for the transfer of dry matter, level control with 120 kg/ha^{-1} of fertilizer meter, in terms of statistical groups were nearly identical. In order to increase the transfer of dry matter, Increase yield, reduce environmental pollution and reduced use of fertilizers (to excess) that also has increased production costs, recommended level of 120 kg/ha^{-1} of nitrogen fertilizer is used. The comparative tables of the average obtained for traits, shows that the highest dry matter transfer from vegetative organs to grain, shoots and the highest participation in helping to yield. And also on the yield and yield components of early planting is recommended that planting be done in time. To compensate for additional costs of fertilizer and planting date is prevented. However, considering that this study in a crop year and has been in place, It seems to get more accurate results and results that can be placed with more confidence about the recommendation, and access to higher performance, We recommend this project be done in several years and multiple locations. To use the combined analysis of possible effects and interactions, and several locations were tested. Should experiment with different levels of nitrogen fertilizer and date in different places and different cultures should be performed.

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