

## SYRIA

## Reduced seed rate and fertilizer adjustments build wheat resilience



**Figure 1: Crop in early spring. A farmer's crop (left) showing dense stand and intense competition, and demonstration plot (right) showing well-spaced, well-tillered plants.**

Risk reduction is a major factor influencing farmers' perceptions and behaviors, and often leads to the inappropriate use of inputs. Throughout the rangelands of the Middle East and Central Asia, the risk of failure of the winter-irrigated wheat crop exemplifies this concern. Whether encouraged by an often-unconscious fear of the quality of local seed, or the subsidization of inputs by government or other bodies, farmers in many countries consistently use a very high seeding rate, and fertilize at inappropriate times. While visible differences during establishment would appear to favor this behavior (Figure 1), the intense competition between plants can eventually result in a considerable detrimental impact on final yield.

### Traditional practices

Focus group discussions in target communities of Syria indicated that farmers in many areas were consistently sowing at double the recommended seed rate, about 250 kilograms per hectare instead of the recommended 125 kg/ha. Farmers could give no consistent explanation for the high rates, which caused intense competition between the young plants, with retarded growth and a reduction in potential yield. Farmers also reported the inappropriate use of fertilizer, with excess nitrogen in the form of urea being applied to the seedbed, and phosphate in the form of diammonium phosphate (DAP) being applied in spring. Phosphate should be applied to the seedbed where it is needed for early seedling root growth, and nitrogen in the spring for rapid foliar development.

### Behavioral approach

In its agricultural livelihoods programming in Middle Eastern and Central Asian countries, CRS has been introducing a flexible behavioral approach based on social behavior change and industry-wide best practices developed in the health sector. Simple, responsive, low-cost, low-risk practices capable of giving a measurable (30+ percent) increase in productivity are identified and promoted through short, timely trainings.<sup>1</sup> For wheat production, a reduction in seed-sowing rates and the timely use of current fertilizers were identified as two critical behaviors that fulfilled these criteria.

### Highlights

- Grain yields rose by 25 to 50 percent
- Input costs fell by 40 percent
- Farmers experienced reduced risk exposure
- Resilience to drought and climate change increased
- Rapid uptake of fertilizer practices
- Farmers took a wait-and-see approach to seed rates
- Doer/non-doer analysis enabled accurate outcome assessment
- Promotion of these behaviors has the potential to substantially improve livelihoods in other parts of the region.



1. See Agricultural Behavior Change Introduction: *Introducing social behavior change to agricultural development*

## Recommended changes

Two simple behavior changes were recommended: (a) reduce seed rates to between 110 and 130 kg/ha; and (b) apply all phosphate fertilizer to the seedbed, and apply nitrogen in spring. These two behaviors were introduced in a training session as outlined below. No other messaging was given, although community members were free to ask questions on any related topic.

The training was provided just prior to sowing and was open to all community members, with a man and a woman from each household encouraged to participate to enable equitable discussion within the household. Training took less than an hour, for minimum disruption to daily household routines. A demonstration plot was established, with the two improved practices alongside the farmers' traditional practices. Seed source and all other practices were the same. Farmers were encouraged to regularly observe the plots. Group meetings were held at "catalytic moments": in spring to discuss the differences in establishment, and again at harvest to discuss yield differences.

## Outcomes

Demonstrations covering 15 villages were planted in November of 2016 and 2017. Yield estimates were taken from three plots in June 2016 and 13 plots in May 2017 (Table 1).

**Table 1: Grain and straw yields**

Year (# plots)	Practice	Grain (t/ha)	Straw (t/ha)	Input costs (SYP) <sup>†</sup>
2016 (3)	Traditional	3.82	12.64	12,753
	Improved	4.75	15.29	7,981
	Difference (%)	+24%	+21%	-37%
2017 (13)	Traditional	2.15	9.50	68,762
	Improved	3.18	12.16	41,530
	Difference	+48%	+28%	-40%

<sup>†</sup> Note: Change in input costs between years is primarily due to devaluation of the Syrian pound (SYP)

In the cropping season of 2016/17, yields of both grain and straw, an important source of fodder for livestock in winter, were over 20 percent higher in plots using improved practices, for an almost 40 percent decrease in input costs. In the 2017/18 cropping season, which was considered dry, the difference in grain yields between traditional and improved practices was almost 50 percent. This can be attributed to the better early root growth, due to added phosphate fertilizer in the seedbed, and the lower seed rate, which together allowed for the development of a more extensive root system. Late in the season, when grain fill was occurring and the soils were dry, the crop with the more extensive root system was still able to access moisture and fill the grains.



**Figure 2: Yield sampling at harvest**



**Figure 3: Improved root development (right) due to recommended seed rate and fertilizer practices**

Focus group discussions in November 2017 found that many farmers in the villages with demonstrations the previous year had changed their behavior. Over 80 percent were applying all their phosphate fertilizer to the seedbed. Although many had reduced their seed rate significantly, only 13 percent were applying at the recommended rate, preferring to see results in their neighbors' fields in the second season.

## Lessons learned

- Careful scrutiny of the wheat production system allowed for the identification of discrete, simple, low-cost, low-risk behavior changes that had a significant impact on wheat productivity and profitability.
- The short-duration trainings were sufficient to relay the key messages and behavior changes needed. They were much appreciated by the groups, especially female members.
- Most farmers took a wait-and-see approach, and usually discussed the demonstration plots or neighbors' experiences before trying the behavior themselves, indicating the need for timely encouragement in subsequent seasons.
- The use of doer/non-doer field comparisons eliminated many issues of data interpretation due to high variability in results between seasons, and also allowed for precise data to support visible outcomes.
- The almost 40 percent drop in input costs represents a significant decrease in farmer risk, particularly in light of seasonal variations in growing conditions.
- The greater relative increase in grain yield in the dry year compared to a normal year reflects the added resilience of the crop to dry conditions due to the behaviors. This is particularly important in light of climate change and variable weather conditions.