Sector	Agriculture
Sub-sector	Crop production
Technology name	Application of windbreaks
Option name	Windbreaks
Scale	Large-scale
Availability	Available
Technology to be included in prioritization?	Yes

Background/notes

Agro-forestry is an integrated approach to the production of trees and of non-tree crops or animals on the same piece of land. The crops can be grown together at the same time, in rotation, or in separate plots when materials from one are used to benefit another. Agro-forestry systems take advantage of trees for many uses: to hold the soil; to increase fertility through nitrogen fixation, or through bringing minerals from deep in the soil and depositing them by leaf-fall; and to provide shade, construction materials, foods and fuel. In agro-forestry systems, every part of the land is considered suitable for the cultivation of plants. Perennial, multiple purpose crops that are planted once but yield benefits over a long period of time are given priority. The design of agro-forestry systems prioritizes the beneficial interactions between crops, for example trees can provide shade and reduce wind erosion.

Advantages of the technology:

Agro-forestry has a broad application potential and provides a range of advantages, including:

- Agro-forestry systems make maximum use of the land and increase land-use efficiency;
- The productivity of the land can be enhanced as the trees provide forage, firewood and other organic materials that are recycled and used as natural fertilizers;
- Increased yields;
- Agro-forestry promotes year-round and long-term production;
- Employment creation – longer production periods require year-round use of labor;
- Protection and improvement of soils (especially when legumes are included) and water sources;
- Livelihood diversification;
- Provides construction materials and cheaper, more accessible fuel wood;
- Agro-forestry practices can reduce needs for purchased inputs such as fertilizers.

Disadvantages of the technology*:*

Agro-forestry systems require substantial management. Incorporating trees and crops into one system can create competition for space, light water and nutrients and can impede the mechanization of agricultural production. Management is necessary to reduce the competition for resources and maximize the ecological and productive benefits. Yields of cultivated crops can also be smaller than in alternative production systems, however, agro-forestry can reduce the risk of harvest failure.

Implementation assumptions (How the technology will be implemented and diffused across the subsector)	Such technology will be applied at agricultural cultivated lands with high risk of erosion (land and wind).
Impact statements (How the options impact countries development priorities)	
Countries social development priorities	• Contributes to food security priority by increasing productivity • Leads to increase in income of rural population • Reduces migration to urban areas from rural communities
Countries economic development priorities	• Contributes to diversification of economic activities priority of the country • Leads to improvement of economic condition of rural population

	• Leads to increase in agricultural productivity
Countries environmental development priorities	• Reduces land degradation and erosion • Carbon absorption is increased leading to improvement of air quality • Increases land fertility
Other considerations and priorities such as market potential	• Agricultural production will increase leading to decrease in the dependence of imported agricultural products at local markets • Fruit production will be increased as well, creating additional income source for local farmers
Costs	
Capital costs over 10 years	The cost of 0.1 ha of windbreak is approximately 400 USD (1 ha of windbreak will therefore cost 4000 USD). Assuming that there is need for windbreak application for approximately 60% of cultivated lands, taking into account relief, climate and erosion factors, a total of 3,240,000 ha of windbreaks will be needed. This will require an investment of around 13 billion USD, which is a huge amount. The process is long-term and should be applied step-by-step. The source of investment could be government budget, financial institutions and international financial organizations.
Operational & maintenance costs over 10 years	Operational cost for technology will be around 100 USD per hectare per year.
Other costs over 10 years	Additional costs will be needed to provide necessary capacity building activities for local farmers.